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SCHOOL HYGIENE

SCHOOL HYGIENE

AND

DISEASES INCIDENTAL TO SCHOOL LIFE

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LONDON

SMITH, ELDER, & CO., 15 WATERLOO PLACE

1885

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P R E F A C E.

THE subject of School Hygiene, on which we have endeavoured to touch in the following pages, is one of great extent and considerable complication, and the recorded materials at our disposal are both scanty and scattered. The Germans, with their accustomed industry, have accumulated much valuable information, principally statistical in character, but the very different domestic arrangements of the two countries prevent effective conclusions being drawn from such evidence. Ventilation can hardly be looked upon as their strong point; the close stove heat so universal abroad causes headache and inconveniences which are not met with here, and outdoor games are only conspicuous by their absence. Under

these circumstances, therefore, we have been obliged to depend on the writings of English authorities, supplemented as far as possible by our own experience, and in this way to construct a manual of our subject, complete, we may venture to hope, at least in form. Objection may, of course, be taken to any precise treatment of the health of schools, on the plea that the ground is already traversed by the ordinary works on physiology and hygiene, and that such special headings as we have furnished are in reality out of place. It must, of course, be admitted that school buildings must be planned on ordinary principles, and that advantage must be taken of the best science and apparatus to make their drainage and ventilation and water supply as perfect as possible. Boys, it may be said, do not differ much from men in the necessities of their dietary, or the limits within which athletic sports, whether of mind or body, may be safely indulged. But, granting all this, we are sure that masters and doctors and parents will agree with us in thinking that it is very necessary that clear and definite rules should be laid down for their guidance, and that the acknow-

ledged facts of science and custom should be adapted to the peculiar conditions of boys and girls *in statu pupillari*.

All we have attempted to do is to lay down broad general principles, which may be amplified and varied according to the discretion of head-master and medical man, and which may be studied by parents and perhaps even by boys and girls. 'Health in Schools' of course includes not only those costly and well-appointed institutions which can afford to adopt every suggestion of modern science, but also such struggling foundations and private enterprises where economy must necessarily reign supreme, and the vast educational chain which now encircles our population under School Board superintendence. We have strictly avoided mentioning any individual institution by name, not only because such special selection would be both invidious and improper in a work of this class, but because the commissioner of the *Lancet* published a few years ago in that paper the details of a most interesting tour of inspection made by him round the principal public schools, to which we refer our readers for more special and detailed

facts regarding the arrangements which he examined with so much care. (Vide *Lancet*, 1875.)

After all, the moral to be drawn is that parents should cease to select their schools solely on account of the eminence of head-master and staff, or of the successes gained in the arena of competition; but should look very carefully and narrowly into all sanitary arrangements, and be very much guided by the completeness of these. Most great schools can be trusted to give a complete education if boys are willing to learn, and to furnish those principles of discipline and high-toned morality which are so eminently characteristic of the English character; but if trustees and head-masters knew that parents not only comprehended, but were prepared to demand, that amount of hygienic precaution which will shortly be considered as at least of equal importance with architectural display, they would perhaps be more zealous in keeping themselves in the van of progress. Great improvements, however, have been effected in this respect within later years, and educational authorities really do seem thoroughly earnest in their wish to keep the health of their pupils fully on a

level with the well-trained excellence of their minds. In all such arrangements the medical officer must work cordially and harmoniously with his employer ; and whilst fully instructed in the best schools of hygienic science, he must be prepared to enforce his views with all the modesty yet decision of a savant, tempered with the give-and-take diplomacy of a man of the world. And in this way, and in this way only, will those who undertake the management of the young justify the very serious responsibilities of their position, and will parents feel that their children are not to have unnecessary and artificial dangers added to those with which Nature has already surrounded the earlier years of life.

Considerations of space have prevented our going into much detail on the various questions treated in the following pages, and we must refer our readers to the standard works on medicine and hygiene for further particulars. But in addition to these there are certain special books and papers which contain much valuable material, and from the perusal of which we have derived much benefit. We

have thought it best to append a list of them here, rather than to distract the attention and weary the eye by frequent notes interpolated in the text, or placed at the foot of the page.

‘The Book of Health,’ edited by Morris; refer more especially to articles on ‘Health in Schools,’ by Dr. Dukes of Rugby, and on ‘The Nervous System in Education,’ by Dr. Crichton Browne.

‘Healthy Homes,’ edited by Dr. Shirley Murphy. Parkes ‘On Hygiene.’

‘Diseases of Children,’ by Dr. Lewis Smith of New York and by Dr. West.

‘Hygiene of Schools,’ by Dr. Budgett.

‘Handbuch der Schul-Hygiene,’ by Baginsky.

Guillaume ‘On School Hygiene.’

‘School Hygiene,’ by Dr. Ralfe.

‘Healthy Schools,’ by Charles Paget.

‘Proceedings of a Conference on School Hygiene at the International Health Exhibition, 1884.’ See more especially papers by Mr. Teale, Mr. Brudenell-Carter, Sir Joseph Fayrer, Dr. Crichton Browne, and Dr. Spencer, with discussions thereon.

‘Handbooks of the International Health Exhibi-

tion'—'On Athletics,' by the Hon. A. Lyttelton and the Head-Master of Eton.

'Training in Theory and Practice,' by Maclaren.

Bogue's 'Health Primer on Exercise and Training.'

'On School Life and its Influence on Sight and Figure,' by Liebreich.

'A Manual of Anthropometry,' by Charles Roberts.

'Flat Foot in Children.' St. George's Hospital Reports, 1874.

'The Proceedings of the British Association for 1875.'

'The Proceedings of Social Science Association, 1873.'

'On Ringworm,' 3rd edition, by Dr. Alder-Smith.

'On Over-strain in Education,' by Richard A. Armstrong.

A collection of papers on 'The New Code and Over-pressure in Elementary Schools,' published by the National Union of Elementary Teachers.

'On the Artificial Production of Stupidity in Schools,' by R. Brudenell-Carter.

Various papers in the 'Journal of Education,' more especially on 'Trifle Blindness.'

'On Educational Pressure,' by Dr. Payne.

'On the General Aims of the Teacher,' by Archdeacon Farrar.

Various interesting works by Dr. Roth.

Stevenson's 'Domestic Architecture.'

For valuable contributions kindly furnished by Dr. Broadbent, Mr. Edmund Owen, and Mr. Brudenell-Carter, special thanks are due.

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SCHOOL HYGIENE.



I.

SCHOOL BUILDINGS.

It but seldom happens that the responsible managers of large schools are able to choose the precise site which health as well as convenience would recommend if they could have their own way. The older institutions are already placed where their founders believed that the necessity for such establishments was most plainly shown, and are now in many cases hopelessly engulfed in the wilderness of streets and houses which have grown up on every side. The pleasant rural surroundings which they formerly enjoyed have long since disappeared, and unless they have been provident enough to purchase largely in the neighbourhood when land was cheap, the enormously enhanced value, in these days of speculative building, of every open space near a large town will make it

impossible for them to hope to get elbow room save at ruinous cost. The only remedy is boldly to tear up their roots, and, regardless of sentiment and historical association, to transfer their establishment bodily to more congenial country soil, and to exchange the dingy and stuffy accommodation of the pre-sanitary times for the ample and spacious arrangements of modern progress. Charterhouse has already shown a good example in this direction. Christ's Hospital is about to follow suit, and we have little doubt that the pious founders would enthusiastically commend a change so manifestly in the interests of sound health and of good work.

When it has been decided to build a new school or to transfer an old one, and when there are sufficient funds at command to enable the governing body to conceive the honourable ambition of making their institution a model one in every respect, all the resources of hygienic science must combine with good taste and special knowledge to make a successful and harmonious whole. It will be well to choose an architect who has had some previous experience in this kind of work, and who is not too independent to adopt the suggestions of those whose opinions are entitled to consideration. The artistic effect of the elevation must of course be regulated by him, and

he should be expected to produce the most picturesque and effective structure which the pecuniary resources at his disposal will permit. Whilst deprecating the waste of money on futile or unmeaning ornament, and more especially the folly of placing elaborate carving under atmospheric conditions which speedily bury all sharpness of detail under a shroud of smoke and dirt, I strongly uphold the duty of every one who builds at all to do it with care and good taste. Our predecessors of centuries ago certainly possessed the art of constructing their great public buildings on an imposing and dignified scale, but little attention was paid to internal convenience or to sanitary arrangement; and as a reaction from this a new school sprung up, which enunciated the remarkable dogma that comfort within was incompatible with outside beauty. Under the influence of this vulgar and not quite exploded error, dreary ugliness and depressing monotony became the rule, the streets of our large towns rose up as hideous as absolute conformity to a bad pattern could make them, and mean and false decoration and slavish imitation of the past seemed all that could be done when higher ambitions came into play. Luckily we have outlived this phase of development, architects and builders have gone with the times, and have recognised the fact that

sanitation has become a fashionable science, and that no one would now dream of taking up the occupation of a house without inquiring very carefully into every arrangement which can have any bearing, remote or direct, upon health. And as a consequence of this a new race of experts have sprung up whose opinion is eagerly sought for on these matters, and architects themselves are vying with one another as to who can most successfully combine a perfectly well-arranged ground plan with a picturesque elevation. The school authorities, therefore, will have no difficulty in getting everything planned according to their own special wants and wishes, but they will naturally see the advantage of reinforcing their opinions by those of an experienced medical man, and preferably of their regularly appointed doctor, who can advise on all points connected with the sanitary well-being of his clients. It will be his duty to see that ventilation is duly carried out, that ample cubic space is provided, that a complete plan of the drains and of their destination is made before the building is commenced, and, in short, that every modern improvement which science can suggest is added to a structure which has very heavy responsibilities to fulfil, and whose imperfections may cause a sacrifice both of life and of health.

These combined authorities, then, will be responsible for the situation of the building, and a general consensus of opinion will agree in selecting a southern exposure, sheltered, if possible, from the north, a gravel soil, and a moderate elevation securing a good drainage outfall. The climate should be dry and bracing, but not uncomfortably keen, the neighbourhood of marshy or boggy land should be avoided, and, notwithstanding the athletic advantages of an adjoining river, it is well not to build too near its banks, as the air is apt to be heavy and relaxing and fogs are of frequent occurrence.

For some purposes of convenience it is desirable that the school should be moderately near a town, but on the other hand there are many dangers and temptations inseparably connected with city life which turn the balance of argument strongly in favour of a country site. The atmosphere is fresher and purer, plenty of scope can be found for games and paper-chases and botanical excursions, and for the study of geology and natural history in the fields instead of within the musty walls of a museum. The isolated position of the school will concentrate the entire interest of the boys during term on its duties and its pleasures, and will make their lives not only happier and more profitable, but will store

up a never-ending supply of associations and recollections on which they can draw in later years.

The neighbouring town supplies the temptations of society which may well be postponed till manhood is reached, or restricted to the holidays; it may encourage dissipation and excess, and it certainly leads to the waste of pocket-money, and the impairment of health in unwholesome and extravagant luxuries. For sanitary reasons, also, it has many drawbacks, chief among which are the perpetual cropping up of epidemics in the inevitable slums, and the practical impossibility of the school keeping itself independent of its neighbours in the matters of drainage and water supply.

Some schools have adopted the plan of separate houses, whilst others prefer the so-called hostel system, which assembles all the boys under the same roof. Each mode of arrangement is not without its enthusiastic supporters, but we ourselves decidedly support the first plan. It enables the various masters to treat their inmates as members of one family, and to introduce far more of individual and domestic supervision than is practicable among a community of three or four hundred accumulated under somewhat of the conditions of barrack life in one vast building. The house master, if he likes his work

and takes a real interest in his pupils, may readily attract to himself their sympathies and even their enthusiastic regard by those social and friendly attentions which, in concert with his family, he is enabled to bestow, and there is nothing in the recollections of a schoolboy more pleasant than the mingled affection and respect with which he usually looks up in after life to those who had successfully guided his studies and supplied the place of a home during school years; and when epidemics make their unwelcome appearance, measures of isolation and of quarantine can much more readily be adopted when the medical officer has to deal with a number of separate houses than when the whole school is accommodated under one sheltering roof. The arrangement which we recommend, therefore, is primarily the school-house, or residence of the headmaster, which includes, in addition to dormitories, the principal class-rooms, and the large hall where speech-days may be held, and where various important functions, educational or otherwise, may be carried on. The other houses are grouped around at short distances; they will accommodate from thirty to fifty boys, and the mode of construction and of arrangement will be so similar in all that one general description will be sufficient to indicate the

scheme on which they should be planned and administered.

If cost is not a matter of very vital importance, stone is undoubtedly the best building material, for if properly chosen and effectively used, it is both durable and ornamental in the highest degree. Fettes' College, near Edinburgh, is an excellent example of the way in which liberality and good taste may combine in the construction of a really beautiful edifice, but it is quite evident that the elaborate carving and detail which are there so effective would be quite thrown away in London or Manchester, where smoke and dirt speedily destroy the effect of elaborate mason-work. When planning a building to be erected in any large city, very careful selection of the stone must be made, as certain varieties crumble and decay under the influence of the acids which are suspended in the air—in illustration of which we have only to refer our readers to the lamentable rapidity of deterioration in our Houses of Parliament. In consequence of this tendency, no less than the cost of stone, our London houses are mainly built of brick, but whether as a protective medium, or from some mistaken notion of ornament, this honest material is frequently faced with stucco, which not only imparts a dreary and depressing

monotony to our streets, but is degrading to the public taste as being a mere sham, a mockery and imitation entirely useless for deceptive purposes. In course of time the once spotless façade presents a most disreputable surface of grime and filth; an elaborate washing now takes place in order to stave off as long as possible the more formal process of renovation enjoined at stated intervals by the lease, but at last the repainting can no longer be deferred. We all know what this means. Worry, irritation, and discomfort, the house made uninhabitable by the smell of paint, a heavy expenditure for no useful purpose, and a general anathematising of the conditions under which the proprietors of this class of property exercise their powers. But happily this form of tyranny is also passing away. We are beginning to recognise practically that we are largely affected by our surroundings, and that it is sufficiently depressing for many susceptible people to live in a large town without their spirits being still further damped by the perpetual contemplation of tasteless forms and dismal colour.

What could have tempted London builders to paint their houses in exact imitation of the pea-soup atmosphere of a November fog will probably never be made known, for a new generation has arisen who re-

joice in the cheerful red brick and picturesque design of more modern tenements, and who carry their views into practical effect by declining to stow away their household gods in the old-fashioned stucco-fronted erections. If our school cannot afford good stone it may well be content with brick, which is susceptible of a great variety of artistic treatment, and which affords very considerable scope both for originality of design and convenience of arrangement. Space being presumably not limited, the building need not be very high, as much wear and tear in running up and down stairs will thus be avoided, and the necessity for lifts, which occasionally get out of order and cause regrettable accidents, will be obviated, and it will also be unnecessary to have any basement floor, which is always a nuisance and inconvenience, serving as a hiding-place for much refuse matter, permeating the rest of the building with objectionable cooking odours, and condemning the servants to a cheerless underground life. As an alternative in cramped localities, Dr. Richardson advises the kitchen to be placed at the top of the house, but in the country plenty of space can be found in an attached wing, connected with the dining-room by a covered way so that the food may arrive hot at its destination.

The dining-hall is regulated in size of course by convenience, and may contain from thirty to seventy without crowding, and as it is the principal room and used for concerts and house-suppers and other performances of a more or less ornamental character, it should be spacious and lofty, and decorated with liberality and good taste. Open rafters are always picturesque and effective, the colour of the walls should be harmonious and well chosen, and anything in the way of art that may hang on the walls should be thoroughly good of its kind. Cheapness nowadays luckily does not exclude the idea of beauty; where our forefathers were compelled to content themselves with worn-out impressions of inferior steel engravings, good etchings and admirable chromo-lithographs and examples of photogravure can now be had for very small prices. And if the worst comes to the worst, the Christmas numbers of the 'Graphic' and 'Illustrated News' will supply an effective and thoroughly wholesome sort of art at most trifling cost. I should be inclined to press this point of effective decoration with some persistence, as during the sympathetic period of youth impressions are readily taken in by the eye as well as by the other senses, and are so firmly retained as to leave their permanent stamp on the mind. This may be called the æsthetic age, and

it is very satisfactory to see how children are now brought up, amid things which must foster and stimulate their sense of beauty, and how marvellously different in this respect are their clothes and their books and the houses in which they live to those which were thought good enough for their ancestors. If a boy has been reared in a well-appointed house, and subsequently spends two-thirds of his life in an ugly school, one of two things will happen. His taste will deteriorate from insensible sympathy with what he sees around him, or he will be ashamed of his Alma Mater in after life, and cease to hold her in that pride and affection which ought to be the privilege of her sons. Parents, therefore, will do well to see that, whilst convenience and health have been duly attended to in the school of their choice, some attention has been paid to picturesque construction and to artistic decoration of a simple but harmonious kind.

Coming now to the dormitories, every one will recognise the extreme importance of their careful and scientific arrangement. One-third of our lives is spent in sleep, and in the case of children about one-half of their existence is dreamt away between the sheets; so that a well or an ill-ventilated room may really be responsible for much of our constitutional vigour, or the reverse. It is true that during slumber

the functions of life are working half-time, the fires are burning low, and only enough vital energy is being expended to hold body and soul loosely together; but we also know that this time of rest is chosen for repair and growth, for replacing old tissue with new, and for enlarging and strengthening the frame to meet the requirements of the future. If every ultimate fibre and cell is therefore soaked in impure blood, if the entire body is kept during these long hours in a state of chronic asphyxia by carbonic acid gas, the result must be a gradual but sure and steady deterioration of physical vigour, and an impetus given to those degenerative changes which cut short the duration and mar the happiness of our lives. If any of us wish to understand the atmospheric conditions under which sleep is sometimes carried on, a visit during the early morning hours to a barrack-room or a hospital ward will be somewhat of a revelation. During the first few minutes the stuffy closeness of the air will seem almost unbearable; but when we have recovered our respiratory equilibrium and begin to look round, we will find that the inmates are slumbering heavily, some are snoring, others are muttering in their dreams or are tossing uneasily about with restless movement. They are all in a state of partial asphyxia; a little more carbonic acid

would make their sleep permanent, but as it is, when waking time comes they feel languid and restless and unrefreshed, and disappointed to think that their night's rest has not done them more good. Not one of them probably has the faintest conception why it is that nature's sweet restorer never seems to exert its proper influence, and some of them have doubtless contributed towards the unwholesome state of things by carefully stopping up the ventilation apertures with the first convenient material which may come to hand. Our first impulse on entering such a room naturally is to push our stick through the nearest pane of glass, and in our own domestic arrangements many of us act on the same principle by sleeping with our windows open. Any one who acquires this habit feels half suffocated when prevented from carrying out his usual custom ; but many delicate people cannot stand the immediate contact of the chill and perhaps damp night air, and infallibly catch cold if any direct aperture let it in too freely ; and in a room full of boys such a plan would be quite out of the question. The draught would impinge inconveniently on some one's head. Catarrh or rheumatism might follow. Parents would grumble, and point out the peculiarities of their son's constitution and the necessity for special care in his individual

case. Some sort of artificial ventilation therefore must be adopted, and there is probably no more exhausting mental process than the attempt to comprehend, either by description or by model, the infinite variety of plans invented by ingenious sanitarians. Many of these are absurdly complicated and apt to go wrong, but Tobin's tubes, which supply an inlet for air, leaving it to make its escape as best it can, have been found to work well in practice, and are now very extensively adopted. They should be placed in the corners of the rooms, and so high that their openings are out of reach and cannot be tampered with, either in the interests of warmth and apparent comfort or to gratify the irrepressible love of mischief common to boys. An open grate will complete the circle of ventilating arrangement, and will be found far preferable to hot-water pipes, which cause an increased fire risk, become frozen and useless when most wanted, and dry and overheat the air most unpleasantly. Good-sized windows should be provided, and they should be widely opened and the bed-clothes turned back for several hours each morning, the night-dresses being thoroughly aired at the same time. A minimum of from 800 to 1,000 cubic feet should be allowed to each bed, with ample floor space, this last point being of importance, as

in lofty rooms a large amount of cubic space may concur with much too small an amount of superficial area. To quote from the excellent paper on school dormitories read by Dr. Clement Dukes at the conference on school hygiene at the International Health Exhibition, 1884:—‘Taking a school bed at 3×6 feet, the superficial area should be quite four times that— 6×12 feet—and the room 12 feet high;’ so that there will be ‘over 3 feet between each bed side by side, and 12 feet between the beds on the opposite side of the room.’

The beds should be of iron and without curtains, the mattress of horsehair, firm and flat and moderately hard, the pillow soft and ample, the sheets of cotton, and the bedding sufficient for comfortable warmth without over-heating. A sufficient number of baths should be provided to enable each boy to indulge in the morning tub so necessary to the comfort of every Briton; washing arrangements should supply plenty of water; and night water-closets, which should be handily situated, should be trapped with the excellent and efficient Edinburgh air-chambered sewer-trap.

Considerable difference of opinion exists on the subject of cubicles, and although they look snug and convenient, the best medical authorities concur in

condemning them, both on sanitary and on moral grounds, and we therefore unhesitatingly advise open dormitories in preference.

A polished floor will do away with the necessity of a carpet, which accumulates dust and dirt, and wall-papers should be discouraged. Glazed tiles, or concrete, or good honest paint are preferable in every way, and more especially for sanitary reasons. The evil day will come when infectious disease breaks out, and when the advantages of a hard and smooth wall which can be vigorously scrubbed with disinfectants will be quite obvious. Scarlet fever has not infrequently been reintroduced by the release of imprisoned germs from layers of wall-paper torn off during the renovation of a room rendered necessary after the cure of some other case of infectious disease.

The actual class-rooms come next under consideration, and it is self-evident that faults in their construction must do infinite and varied harm. We have already referred to the importance of breathing pure air during sleep; but the brain suffers less than the other organs of the body from a deficiency of oxygen at this time, because the physiological condition of slumber depends on an anæmic state of the cerebral centres. During mental work, however, things are far different. The brain, so rich at all

times in vascular supply, is now engorged with blood, and if this blood is surcharged with carbonic acid gas we all know what the result must be, and that headache, dyspepsia, depression, and bad temper, both in the teacher and the taught, invariably follow.

Whenever boys' attention begins notably to flag, when they seem to grow dull and sleepy and stupid and careless, when yawning becomes general, and shuffling of feet and unnecessary coughing make themselves heard, then the master may come to the conclusion that one of two things is taking place. Either that he is teaching his class badly and failing to sustain their interest in the work, or that the Black Hole of Calcutta is being imitated on a minor scale, and that the effort to keep up a decent show of order and of mental concentration is too much for the victims to bear. He had better clear the room for a short time, and throw the doors and windows widely open ; or, still better, it should be arranged, if possible, that no class should be kept sitting for more than an hour at a time, and that a change should be made, if only to another room, short intervals of recreation being frequently sandwiched with spells of work.

About half the cubic space allowed for dormitories is sufficient here, and a good system of ventilation

such as we have already described ought to ensure so thorough a renewal of the air that 3,000 cubic feet for each occupant should pass through the room every hour, large fireplaces aiding in maintaining atmospheric freshness, and all windows being left open whenever the rooms are empty and not in use. If the windows, however, are placed on opposite sides of the room, there can be no difficulty in causing a thorough draught and consequent effectual renewal of the contained air.

We must be careful, however, that an undue enthusiasm for ventilation does not result in making our class-rooms uncomfortably cold. Whilst we may admire, we will hardly care to imitate the heroism of a writer in the 'Times' quoted by Stevenson, who somewhat dogmatically asserted that 'even in frost the cold air should be let in plentifully, and that people should sit in their rooms in their great-coats and hats.' Probably nothing depresses the nervous system more than cold, and if boys sit shivering and blowing their fingers and enduring the tingling and irritation of chilblains it will be quite hopeless to expect them to do really good work. And the danger will be very great of congestion seizing on some internal organ and laying the seeds of future disease. To obviate such evils the temperature should be

strictly regulated by the thermometer, and kept at between 60° and 70° , any excess in either direction being carefully avoided; and if it be found impossible to effect this by means of open fireplaces we must have recourse to some kind of stove.

The system of heating our rooms and bodies by the air which we have to breathe makes many people feel dull and listless, and even in America, where it is so much used, it meets with severe animadversion. Mr. Leeds, in a treatise on ventilation published in New York and quoted by Stevenson, says that this heated air 'is the great curse of the American people. It is that dry, lifeless, withering, debilitating, poisoned stuff with which most of our best public buildings, and most unfortunately many of our school-houses too, are filled and warmed, and which is filling our systems and warming and drying the life and substance out of about two-thirds of the people of this country.'

In German schools, also, this mode of heating is universal, and must be held responsible for the headache, giddiness, nose-bleeding, and other disorders which, though so elaborately described by Continental authorities, are seldom met with here. We cannot, therefore, recommend these close iron stoves, which, however economical of fuel, create a dry and uncom-

fortable atmosphere, causing sensations of oppression and closeness from the leakage of the products of combustion into the room. The large German earthenware stove will be found to work well, and there is no difficulty in obtaining a large selection of artistically constructed patterns, which may be open in front so as to give somewhat of the cheerful effect of the ordinary grate. And if the air seems to get parched and dry, we must establish on the flat top of the stove a shallow pan of water to supply an abundance of moist vapour by evaporation.

It is of great importance that school-rooms should be constructed with some reference to acoustic principles if there be any, and, if they do not exist, that architects should direct their attention to the subject, and see whether they cannot find out the difference between buildings which are, to use a popular phrase, good or bad for sound. Nothing can be more irritating to a speaker than to find that his utmost efforts cannot make his audience hear what he has got to say, and the wear and tear of teaching must be greatly increased if the master has to talk twice as loud as should really be necessary to reach the ears of his hearers; and, on the other hand, quiet should be carefully considered. If we cannot help the crash and din and conflicting sonorous

vibrations encouraged by a badly constructed room, we may at least see that the doors shut without a distracting bang, and that every footfall does not make so much noise as infallibly to distract the attention from work. The doors should swing easily on their hinges and their closure should be deadened by india-rubber, whilst the floors may be covered by kamptulicon, cocoa-nut matting, or any other clean and elastic material, which will also lessen another minor misery, dust, which gets into the eyes and causes coughing and general annoyance, by no means favourable to concentration of the mind.

Space and atmospheric freshness, then, are primary requisites in order that the mental powers may work vigorously under the stimulus of duly oxygenated blood, and of equal importance is a proper arrangement of light. Although we have happily emerged from the days of fiscal eccentricity which could screw money out of a window tax, we have not yet reached perfection in our use of the illuminating powers of nature. Either the room is kept so dark that the eye has to follow with strain and difficulty the object to which it is directed, or a blinding glare dazzles and confuses, and interferes with the acuteness of vision. In school life faults such as these are responsible for short sight and other defects which

may seriously interfere with future success; and in Germany more especially the evil has reached such a pitch that scarcely any one seems to approach male adult life without the inevitable accompaniment of a pair of powerful glasses balanced on the bridge of the nose. Myopia is also alarmingly on the increase in England, and, although often hereditary, it is directly caused by three leading factors—school books, badly arranged light, and ill constructed seats.

The first of these is held responsible by the Germans for many of their visual defects, and it is most important that they should be clearly printed, that the lines should not be too long so as to fatigue the eye, and that in classical works Babbage's recommendation should be carried out, a slightly yellow tinge given to the paper.

Concerning the second and third, the curious may refer to the very copious literature provided by the industrious authors of Germany and France, but we are unwilling to overload our pages with references to many authorities, and will therefore place before our readers at this stage a brief extract from the views of Liebreich, and when we come to consider school diseases make more detailed reference to eye disorders under the experienced guidance of Brudenell-Carter.

He shows that three changes in the functions of the visual organ are immediately developed under the influence of school life ; the first of these, short sight, being almost exclusively so, being much more common in schools where unfavourable optical conditions prevail, and, although often hereditary, the predisposition may be alleviated by judicious treatment. The second, amblyopia, or a decrease in the acuteness of vision, is often produced by unsuitable arrangements for work ; and the third, asthenopia, or decrease of endurance, the most frequent and serious of all, is, like the other two, usually produced by ‘insufficient or ill arranged light, or from a wrong position during work.’ Under these conditions we are obliged to lessen the distance between the eye and the book while reading or writing, and we must do the same if the desks and seats are not in the right position, or of the right shape and size. ‘When the eye looks at a very near object, the accommodating apparatus and the muscles which turn the eye, so that the axes converge towards the same object, are brought into a condition of greater tension, and this is to be considered as the principal cause of short-sightedness and its increase. If the muscles of the eye are not strong enough to resist such tension for any length of time, one of the eyes

is left to itself ; and whilst one eye is being directed to the object, the other deviates outwardly, the images which fall upon it are no longer attended to, and its sensibility becomes blunted or amblyopic. Or perhaps the muscles resist these difficulties for a time, become uneasy, and thus is produced the diminution of endurance.

‘How can these evils be prevented? The light must be sufficiently strong, and must fall on the table from the left-hand side, and, as far as possible, from above. The children ought to sit straight, and not have the book nearer to the eye than ten inches at the least. Besides this, the book ought to be raised 20° for writing, and about 40° for reading. The proper light is most easily obtained if the classroom is of an oblong shape; the windows being in one of the long sides, and the tables arranged parallel to the short walls, so that the light falls from the left hand. The desk of the master ought to be placed near the short wall, towards which the scholars look.’

He goes on to tell us how rarely these simple rules are practically recognised: how some school-rooms are lighted from the right, so that the hand inevitably throws a heavy shadow on the paper; that others have low broad windows on three sides

at once, rendering any suitable position of the desks an impossibility; whilst the Education Department enjoins the most injurious arrangement of all, by ordering, in Rule 15, that 'the windows should be so placed that a full light should fall upon the faces both of the teachers and of the child.' Now light from behind is bad, because the head and upper part of the body throw a shadow on the book, but that from the front is far the worst, because it not only fails to attain the object desired, but is most hurtful to the eye. The moral, therefore, is that we should look sharply after our architect, and see that no ambitious notions of artistic effect interfere with the efficiency of our building for its actual function of enabling education to be conducted with comfort and safety.

The faulty construction and arrangement of school seats must clearly be held responsible for certain ailments due to the crooked and stooping position which children are sometimes compelled to assume. They are often too high, so that the sitters occupy the extreme edge in their efforts to reach the ground with their feet, failing which an irritating pendulous motion is kept up, or they may perhaps have no backs, a condition of things very common in America, and there believed to cause the preval-

ence of 'high shoulder.' Short sight and fatigue of the accommodation apparatus of the eye are often caused by want of proper inclination of the desks; curvature of the spine arises from want of proper support to the back, and the sprawling and contorted position encouraged by too great a distance between the seat and the desk, disproportion between the height of the seat and that of the desk, and wrong form and shape of the desk.

Heineman says, 'The primary conditions of a proper subsellium are—first, a seat sufficiently broad to support the whole length of the thigh; and secondly, a footstool at such a distance from the seat as to support the feet without the slightest stretch of the muscles of the lower limbs or feet—*i.e.* a distance exactly equal to the length of the shank.

'The back of the chair must support that portion of the sitter's body upon which the whole trunk depends for its steadiness, *i.e.* the backbone, as far up as the shoulder-blades will permit, upon the easy mobility of which depends the normal action of the chest, arms, and hands. It must be so near the table and so inclined that the sitter can lean upon its entire height whilst engaged in reading, writing, or drawing.'

Liebreich, who has devoted much attention to

the subject, points out that the faulty construction of school seats must clearly be held responsible for a variety of ailments due to the crooked and stooping position which children are sometimes obliged to maintain. Short sight and fatigue of the accommodation apparatus of the eye are due to faulty inclination of the desks; curvature of the spine is produced by want of proper backs, and the sprawling and contorted position encouraged by too great distance between the seat and the desk, disproportion between the height of the seat and that of the desk, and wrong form and shape of the desk.

He thus sums up his views:—

‘1. One and the same size and model of desk should be used for children and grown-up persons of both sexes.

‘2. The adaptation to the height of each child should be effected by varying the height of the seat and the foot-board.

‘3. The edge of the table is always to be perpendicular to that of the seat.

‘4. No seat is to be without a back, and the top of this is always to be one inch lower than the edge of the table for boys, and one inch higher than the edge of the table for girls.

‘5. In all classes where the boys change places,

the height of the seat is to be regulated in proportion to the average height of the pupils.

‘6. In all girls’ schools, in all those boys’ schools where places are not changed, in boarding-schools, and in private school-rooms, the seat of each child should be accurately regulated in proportion to its height.’

It is well that school desks should be slightly inclined, that they should be high enough to prevent stooping the head over the book, and one part of the master’s duty should be to check bad habits in posture, which not only injure the figure, but encourage various congestions and unsymmetrical developments productive both of inconvenience and danger.

Most large schools are provided with studies in which, either singly or in pairs, boys may carry out their work free from noise and interruption. Occasionally they contain beds, but this arrangement is quite indefensible on many grounds, and it is essential that the sleeping accommodation should be entirely separate from that which is devoted to any other purpose. In some of the older institutions we may see rows of these little dens opening out of a passage or corridor somewhat after the fashion of prison cells, and hardly more convenient either in size or in arrangement. When crammed with the furniture

and nicknacks which schoolboys love to accumulate around them, we may sometimes wonder how room can be found for the occupant himself when he wishes to sit down and begin his work.

These dark, cramped, and stuffy holes cannot be looked upon as up to the requirements of modern civilisation, and we accordingly find a very different state of affairs when new buildings are constructed in direct proportion to the numbers which they are supposed to accommodate. The studies are then of decent size, allowing sufficient cubic space, and evening preparation can then be carried on with moderate comfort, and some reasonable scope can be given to decorative taste without overcrowding to a degree recalling the heterogeneous confusion of the old curiosity shop.

Every house occupied by boys should have an empty hall where they can throw off their wet or dirty things when they come back soaked and muddy from football or house run. An efficient housekeeper will see that this is promptly and thoroughly done, and the clothes can then be taken to a closet heated with hot air, or hung up in Nelson's apparatus, where they can be quickly dried.

The preceding remarks on domestic hygiene apply with especial force to the masters' private houses,

and most particularly to those which receive boarders. Any defect in their own home arrangements, any epidemic in their families, may be the starting-point of troubles which may spread through the entire school; and it is most important that all the details of drainage and ventilation and water supply should be placed under the direct responsibility of the medical officer. The various houses receiving boys should, if practicable, belong to the school, and thus subject to that supervision which might seem officious in the case of private property. The head-master should strictly regulate the number contained in each dormitory, and he has a right to expect that the health of his general community shall not be endangered by carelessness or ignorance or obstinacy on the part of those who may possibly be impatient of the restrictions of sanitation or incredulous of their necessity.

A separate laundry is an absolute necessity in every large school. When clothes from a wide variety of sources are freely mixed together in the washing-tub, disease may readily be spread, and several epidemics of scarlet fever have been directly traced to this mode of communication. The most scrupulous care will not prevent the possibility, however remote, of such an accident, and it is much

safer that independence of outside aid should be established, and good machinery provided by which manual labour may be reduced to a minimum.

The water supply of a school should be constant and unlimited, whether for domestic or other uses, and it is most important that it should be, if possible, independent of every other authority. The companies to whose tender mercies the inhabitants of our large towns are unhappily entrusted, and from whose autocratic proceedings there seems to be no appeal, by no means keep up a high standard of purity, and not only make their service intermittent, and therefore dangerous during seasons of drought, but have a playful habit of cutting off the supply altogether if, through any inadvertence, their little bill be not promptly paid. Under certain conditions of site it may be found difficult to avoid sharing in the general arrangement of water supply, but, if in any way practicable, deep wells, thoroughly removed from all possible contamination from drains or latrines, should be established; or in a hilly district even a better plan will be to establish a reservoir at a higher level than the house, from which the water may be very conveniently brought by gravitation. A river supply is apt to be uncertain when the weather is dry, but rain-water may be collected in considerable

quantity from the roof, and will be highly prized from its softness for washing purposes.

Water is well known to be the most frequent medium for the propagation of a variety of diseases, and numerous epidemics of typhoid and cholera have been directly traced to communication between drains and water-pipes, or to the soakage of the discharges from the sick into wells. Dangers of this kind will be minimised by an entirely independent source of water supply, and if anything suspicious occurs the sanitary authority will be at once able to put his finger on the weak place and adopt such means as may be necessary to rectify the evil. But no real danger will be possible if the drainage is in good order, and on this point very special and vigilant care is most urgently needed. Our modern systems, so excellent from the scientific standpoint, and so efficient in practice if properly worked, may readily be converted into peculiarly subtle machinery for the spread of disease. If a large sewer is not sufficiently ventilated, dangerous gases are generated which force their way into our houses in spite of every precaution, and, even if openings are regularly established here and there, a dry season comes when flushing cannot be thoroughly carried out, and when bad smells begin to give the alarm. Science, therefore, has

done this for us, that whereas our ancestors died from typhus and plague and other results of overcrowding, we make and store sewer gas on a large scale and carry off the superfluous population by means of typhoid, diphtheria, and other septic disorders. We must always be on the alert to see that we do not sacrifice our health or risk our lives to gratify the ignorance or obstinacy of an architect or a builder or a plumber, and that not only the exact construction and course of every drain is known and mapped, but that there is thorough ventilation and trapping, and that every pipe is perfect and complete.

Sanitation has now become fashionable, and the first thing that occurs to a householder's mind is to make careful inquiry into the state of the drains ; but this was not always so, and Mr. Teale, in his well-known book, tells some strange but too true tales of what has undoubtedly taken place.

We must here again preach the importance of independence, and the great value of being detached from any neighbouring systems of sewerage with its manifold dangers. This will be impossible in a large town, and in the country there may be difficulties in the way of obtaining a sufficient outfall, or from the absence of a river at a sufficiently

convenient distance. Under these circumstances we may revert to cesspools, and under strict precaution and rigid care they may work well enough. If they are frequently emptied, and if the inevitable soakage into the surrounding earth cannot get near any source of water supply, things may go on without danger, and no harm may result. Some schools, however, have successfully adopted the earth system, and this is a preferable plan, which, with perfect cleanliness, and if a dry peaty loam can be readily obtained for free use, will be found to be very convenient.

Disinfectants must be liberally used as a matter of routine, and every drain and water-closet must be frequently and thoroughly flushed.

If independence cannot be secured, if the school must of necessity be dependent on a neighbouring town for its water supply, and if its drains communicate, however indirectly, with those of others, it is very important that either the head-master or one of his most trusted colleagues should have a seat on the Local Board. Not only will this direct his attention to sanitary matters, but his judgment and common sense will be of great service in regulating the business, and in defeating the ignorant and obstructive opposition given by the typical vestryman to everything which fails to come within the range of his

limited understanding. It is only right that the authorities of the school should know what is going on in their neighbourhood, that they should have a voice in the way in which the ratepayers' money is to be spent, and most especially that they may be able to enter their protest against anything prejudicial to the public health, and to take part in all arrangements for the detection, prevention, and stamping out of infectious disease.

The school-house proper and the various masters' houses scattered around at short intervals are not the only buildings of which our community is composed. The chapel stands near, and all that concerns us is that it should be well warmed with hot pipes, so that in winter the boys should not sit through the service shivering and congested with cold, and predisposed thereby to derangement of some internal organ. The cricket pavilion and the racquet court and the gymnasium will of course be constructed according to the best models, and if a neighbouring river does not flow within convenient distance, a swimming-bath will supply the deficiency. We may have more to say about these in a future chapter, and will also describe the best arrangements for the hospital, which must be placed within convenient distance.

II.

SCHOOL DIET.

WITHOUT going into all the elaborate minutiae of detail furnished by scientific men on the subject of diet, we may briefly lay down the leading principles established by their researches, and of which the practical value is beyond dispute.

The human body is built up of a variety of tissues, which are perpetually wasting under the influence of active use and natural decay. Of these the most important are the nitrogenous, which include the flesh or muscles, the fibrous and gelatinous structures, and some portions of the nervous system, and their integrity is essential for the manifestation of energy or of chemical change. The fats also play no mean part in the economy, for not only do they perform the mechanical duty of filling up interstices and angles and rounding the contour of the body, but they enter largely into its composition, and serve to keep up the due equilibrium of animal heat. It is quite evident that life could not long be maintained

if our temperature went up and down like a thermometer according to the atmospheric medium in which we may chance to be placed, and if amid the burning heat of the tropics or the snow of the arctic regions we were to burn or freeze according to circumstances. As a matter of fact, the body heat remains much the same wherever we may be placed, and varies little, if at all, save under the influence of disease. This convenient and most necessary arrangement is kept up by our own internal fires, fed principally by our fatty tissues and by fatty and starchy food, and we will find that death from starvation, which essentially consists in death from cold, can be staved off much longer by those who are amply furnished with adipose tissue. Hybernatory animals which lie up for the winter and take no nourishment simply feed on themselves, and the famous Dover pig which was buried in its sty for ninety days owed its life to the gradual consumption of the fat which had been previously deposited under its skin by a liberal diet.

Vegetable acids and mineral salts are also necessary to keep up the alkalinity of the blood, and to maintain the rigidity of the skeleton or framework which forms the basis for the exercise of muscular movement, and water must also be furnished in considerable quantity.

The destinations of food therefore are :—

1. To build up and repair the tissues, and to balance reconstruction against waste. The admirable machinery of nature provides that our bodily framework, when once finally put together, is kept up to the same standard of size and weight, so that we do not continue growing until we reach the height of twenty or thirty feet, and that exceptional use does not develop any individual part out of symmetrical harmony with its neighbour. It would be very inconvenient if our right arm were twice the length and thickness of the left, or if the right eye projected with telescopic prominence from the socket. Under ordinary circumstances of health, and if we are properly fed, we remain much the same from year to year, and to maintain this equilibrium is one of the most important duties of diet.

2. To keep up the animal heat.

3. To evolve enough force to supply the basis of working power.

It is therefore evident that a considerable variety of nutritive ingredient is necessary in order that these complicated processes may be kept in working order ; and a convenient form of classification of food will be found to be as follows :—

1. The albuminates, containing the all-important

nitrogen, and whose principal duty is to nourish the nitrogenous tissues. They are best known under the form of meat, fish, milk, eggs, and some of the more sustaining vegetables, such as potatoes, peas, rice, Indian corn, oatmeal, &c., and on an average about four or five ounces should be daily consumed by an adult leading a fairly active life.

2. Fats, containing no nitrogen, but made up of carbon, hydrogen, and oxygen, and which supply the nutrition of the adipose tissues, and furnish energy and animal heat by oxidation. From two to three ounces should be daily consumed.

3. Hydrocarbons, having the same elementary composition, which also evolve warmth and energy, and which may be converted into fat. Starch and sugar are principal members of this group, and of them from fourteen to fifteen ounces are daily consumed.

4. Mineral salts of potash, soda, calcium, and magnesium, which support the rigidity of the bodily framework, and supply hydrochloric acid for the gastric juice. About one daily ounce is the quantity usually taken. And we must not forget to add the necessity for vegetable acids, one of whose important functions is to keep up the alkaline condition of the blood.

5. Water up to the quantity of five pints, which represents the daily loss.

This diagrammatic scheme of dietary forms the scientific basis on which have been constructed all the systems in ordinary use, from that which nourishes the babe in early infancy up to the carefully calculated quantities of food which are found sufficient to keep our soldiers and convicts in good health.

Those who are not debarred by poverty from choosing what they like to eat and drink generally become tolerable judges after years of experiment of what suits them best, and we accordingly find that the average Englishman knows pretty well how to construct his own bill of fare. Under certain conditions of festivity a greater variety and probably a greater excess of food is taken than at other times, but the surplus probably passes undigested out of the system ; and the assimilative functions are undoubtedly stimulated by the pleasurable excitement of social intercourse. There is no necessity, therefore, for ordinary people, leading ordinary lives, to study very elaborately their own personal schemes of nutrition ; still less should we advise them to weigh out and calculate the constituents of every meal lest they should fall below the standard of full nutritive value.

Experiment has shown that not one of the four classes numerated above will of itself sustain life—that animals fed on starch or sugar speedily die of starvation, and that human vigour cannot long be kept up on a diet of pure flesh—and experience will soon convince us all of the importance of mixing and varying our daily food. The structure of our digestive organs and the character of our dentition show that we are intended to feed on a mixed diet, and accordingly we find a constant craving for some one or other ingredient which is necessary to keep up the balance. Some of us have a special fancy for fresh vegetables; others are great bread-eaters, or devour large quantities of cheese or milk; those who do not care for meat are addicted to large bowls of oatmeal porridge; whilst the dislike to fat which seems to be instinctive with some is compensated by the consumption of sugar or of butter. Nature frequently puts in her word in the form of likes and dislikes when she sees that her interference is necessary, and as a general principle one may say that people take their favourite dishes, not only because of actual preference, but because experience, more felt probably than acknowledged, has shown them that they are digestible as well as palatable. Appetite and taste, then, within ordinary limits are tolerably safe guides, and

may be judiciously and quite legitimately stimulated by variety, by good cooking, and by an ingenious and scientific blending of those nutritive elements which are necessary to sustain vigour and to prolong life.

In spite of energetic advocacy, and the undoubted example of various persons who preserve full mental and bodily activity without touching meat, vegetarianism makes little progress. The general consensus of opinion seems to be that flesh-feeding nations have usually been the world's rulers, and that this form of nitrogenous diet, from its compactness, easy digestibility, and palatable variety, will never be superseded by others, equally valuable though they may be from the purely theoretical standpoint. And it is also a usual, and probably a sound opinion, that the ordinary bulk of humanity will not display as much energy either of body or of mind when fed exclusively on vegetables as when they partake of our ordinary mixed diet, of which meat forms an essential part.

Applying these general principles to the case of childhood, we must remember that between the period of infancy and adult life growth is rapidly going on, and that this process makes very serious demands on the constitutional vigour. Not only has

the daily food to fulfil its allotted task of repairing waste, of sustaining heat, and of evolving force, but it must supply the material necessary for the active construction of every organ and tissue in the body. From the moment of our first appearance in the world up to the age when full development is finally attained we are growing either in length, breadth, or physiological completeness ; and according to the plan laid down of the work, and the way in which that work is carried out, depend our strength or weakness in after life. An infant is born with certain inherited peculiarities and hereditary tendencies which may be lessened, if not obliterated, by early watchful care, but the responsibility for its future health must mainly rest on those who have to guide its footsteps through the difficulties of its early career.

The cant phrase that 'the boy is the father of the man' contains a profound truth, because he undoubtedly stands in that position of relationship to his own tissues. Nothing is more remarkable than the precise and Chinese-like fidelity with which every organ and its component parts are reproduced during the thirty days in which the interstitial reconstruction of the human body is supposed to go on. Until the time comes when degenerations set in, we do not vary in the slightest degree save by a few casual

pounds of weight from the preceding year, and not only is the normal standard of development maintained in full perfection, but scars and accidental growths also remain quite unchanged. All this is carried out according to a pattern adopted long before manhood is reached, and the quality of intimate structure on which the satisfactory performance of function depends is due largely to the conditions of early childhood. If a muscular fibre is laid down on feeble and flabby lines, if nerve-cells are only half-nourished by blood which is itself thin and deficient in the essential elements of nutrition, if bones want rigidity, and if glands are ready to break out into irritative revolt at a moment's notice, a false note has been struck which will continue to vibrate throughout life, and, however energetically amends may later be made for early defects, the constitution has been formed, the bad example of inferior tissue formation will be followed more or less even under healthier conditions, and the irreparable damage which has been done can never be absolutely undone. Physiologists tell us that our bodies are intended to last for a hundred years, and that, under proper hygienic and other regulations, the fulfilment of this law should be an affair of every-day occurrence in place of extreme and exceptional rarity.

Possibly life may not seem so well worth living to all as to make them wish to have it prolonged beyond the Scriptural threescore years and ten, and indeed to the poor the prospect of old age can hardly be an inviting one. Racked with rheumatism, and tormented with the dyspepsia engendered by coarse food and imperfect teeth, chained to a routine of monotonous drudgery long after the bodily powers have become unfit for hard work, and finally, when compelled to stand aside and make way for younger men, reduced to look for his only haven of earthly rest to the dreary workhouse ward. But whether or not we wish to prolong our days beyond the usual average, there can be no doubt about our desire to get as much contentment and happiness and useful work out of our allotted span, be it of fifty or seventy or a hundred years, and there can be even less doubt about the fact that sound health alone will enable us to do this. 'The great secret of success in life is to be a good animal,' writes Herbert Spencer, for good health means bodily vigour, a capacity for looking at the bright side of things, and that confidence in our own powers which is so essential for the best use of those gifts which nature has bestowed upon us. To attain to this desirable state of matters we must have been brought up amid good air, ample light, and the

best sanitary conditions, but above all we must have been well and sensibly fed; and we will now proceed to furnish some details regarding the proper scheme of nutrition for the young.

During the first few months of infancy we need not take much trouble about the dietary, for nature has provided an abundant source of the most suitable food containing all the proper elements in due proportion. If from any cause the supplies from this domestic dairy run short, they may be supplemented by the milk of the cow diluted with one-half of water and sweetened with sugar, but up to the time of the first dentition nothing else should be allowed, any form of starchy food merely acts as a foreign body; but when the teeth appear they require some occupation, and a biscuit or a bit of bread may be occasionally allowed. Late weaning, so common among our poor classes, is a fertile cause of rickets and struma, but about the fifth month a little animal food is not out of place, ranging from a little gravy mixed with the potatoes up to meat finely divided by chopping. For some years meat once a day is quite enough, the staple diet being milk and oatmeal in the shape of porridge, on which the children of our Scotch agricultural classes are nourished up into strong and vigorous manhood, varied with an occa-

sional egg, a little fish, and an abundant supply of well-cooked fruit. During home life sensible and well-to-do parents generally manage to feed their children on the right things, and can generally find out when they are wrong by loss of appetite, a diminution of healthy vigour or of healthy aspect. Boys have generally excellent appetites, and, if simply brought up, prefer simple food simply prepared, and will take their joint and pudding from day to day without craving after entrées and the more elaborate manifestations of gastronomic refinement. But they like some variety, and in England sufficient use is not made of vegetable soups, which form an almost invariable addition to the dietary in Scotland, and are not only nourishing and wholesome, but remarkably palatable. Potatoes, peas, beans, carrots, artichokes, spinach, cabbage, leeks, and barley are all by turn pressed into the cause, either alone or in those forms of combination which are so popular under the name of Scotch broth or hotch-potch, and their popularity is invariable. The roasting of meat should be varied by boiling and baking and stewing, plenty of fresh vegetables should be allowed, and rice pudding should frequently alternate with fruit pies or simple dishes of plainly stewed fruits.

There is sometimes more difficulty in dealing with

girls. They are apt to be fanciful about their eating, taking a dislike to meat, and preferring sloppy teas to substantial meals; as a consequence of this they are frequently under-fed, Dr. Graily Hewitt giving a timely warning in the following graphic terms (*Lancet*, 1879) :—

‘In the case of young women between the ages of fourteen and twenty, when the growth is, or should be, proceeding at a rapid rate, the amount of material required for the building up of the body is very great, and in these cases an insufficient dietary produces necessarily very marked effects. A common instance of chronic starvation is afforded in the case of young girls who, in consequence of neglect at home, or want of a sufficiently good diet at school, fall into a condition of weakness and debility. Many parents, living themselves in affluence and surrounded by plenty, seem to consider that girls require little food, and the small quantity of meat allowed in some households is chargeable with the inflicting of much after-weakness and ill health. Schools are, many of them at least, open to the same imputation in regard to the dietary. Bread and butter and puddings are often relied on too exclusively, and the amount of animal food allowed is insignificant.

‘Two or three years of such insufficiency in the

way of dietary is enough to ruin the soundest constitution. Once for all, I would state my conviction that between the ages of twelve and sixteen or seventeen, during which time girls are either at school or being educated at home, they require at least two good meals of meat daily, and anything short of this appears to me to be insufficient.'

Traces of superstition long continue to linger on even in civilised countries, and fads and fancies about the feeding of children will probably never be thoroughly exploded. One of these is that they must eat up all their food without the slightest reference to whether they like it or not, and that if their plate at dinner is not thoroughly emptied special remonstrance must be made and penalties threatened. Grown-up people are permitted to give their likes and dislikes free play, and judicious wives and cooks study the taste of their lord and master, and see that he is duly furnished with his favourite dishes, but the poor victims of nursery abstract principles are often forced to consume things which they abhor. Many a battle royal has been fought over the subject of fat, which many children abominate, and if we compel them to clear up every morsel which happens to be placed before them, we shall probably find in the end that we have gone against

an instinctively indicated direction of nature, and that digestive derangements will be the result of our tyranny. Of course we do not mean to advise that the youthful inmates of our homes and schools should be allowed to select their own bill of fare, and to indulge every eccentricity which a possibly depraved palate may suggest, but it is very important that they should be well nourished, and when wholesome food has been placed before them we must carefully inquire into the reasons why they persistently refuse to consume any portion of it. It may be that idiosyncrasy comes into play, and that they are constitutionally unable to eat mutton or pork or something else, which is poison to them although meat to others, or they may simply have an instinctive dislike for one thing and a craving for something else, which is probably not founded on mere caprice, but on the desire of nature to point out what their constitution needs. If we are thoroughly convinced that their peculiarities are real, and do not proceed from stubborn perverseness, or from precocious adoption of the fastidious taste of a gourmet, we must take our measures accordingly, and see that they do not become half-starved in the midst of plenty. The fat, which they resolutely decline in the form of tallowy masses adhering to the beef or mutton of

our prime English joints, will readily be taken as bacon, or butter, or milk, or cream ; and sugar, a frequently debarred luxury, deserves a place of honour in the diet scale. Every disciple of Banting knows the influence of sweet things in increasing or diminishing weight, and the desire of schoolboys for pastry and ices, which grown-up people condemn as unwholesome because they cannot digest such things themselves, may really be another indication of nature's wants. A still current fad lays down the maxim that sugar decays the teeth, and, although there is not the slightest foundation for this assertion as a direct physiological fact, there is this amount of indirect truth, that confectionery is often taken between meals, that the appetite is thus impaired and the digestion injured, and that dental caries may follow. This amount of good will have been done by the warning if it dissuades children from eating trash at unseasonable hours, but if it prevents us from permitting them the use at proper times and seasons of a dietetic agent which, in addition to forming fat, provides fuel for nature's fires and motive power for the production of force, then harm will have been done and we must uplift our voices against so pernicious an error.

Another old-fashioned notion founded on a

plausible theory is that we must restrict the use of fluids at meals because they dilute the gastric juice, and poor thirsty little children are debarred from a refreshing drink of water for fear of hindering digestion. It will be satisfactory to them to know that this is a delusion. The gastric juice is not secreted until the conclusion of the meal, the fluid taken into the stomach is very rapidly absorbed, and its presence may even be beneficial by furnishing a store from which the process of secretion may draw the material necessary for the formation of the digestive juices. When we remember that two-thirds of the human body are formed of water, and that five pints are daily lost from the system, we can appreciate the cruelty of preventing any one who is in the enjoyment of average health from drinking when they feel disposed.

Regarding the use of alcohol in early life, the active period of growth and development is emphatically that during which nothing of the kind is required. Children, therefore, should only get it as a therapeutic agent, and never as a matter of routine, and as with them it is usually an acquired taste, they will not display any special desire to acquire the habit. Among grown-up people the consumption of strong drink is only to be defended as a luxury, as

counteracting some of the depressing conditions of modern life, or as improving digestion, and many people are distinctly the better for a moderate allowance. In the same way cases will arise among the young where a little alcohol, preferably in the form of beer at dinner, will prove of essential service as a nervine tonic, and as whipping up a flagging appetite; and when boys or girls are growing fast and working hard, and if they become weak and pale and languid, then a stimulant is needed, and should be prescribed under strict medical supervision.

When the period of school life is reached, children must be specially well fed, because, in addition to the demands we have already noted as being made on the constitutional powers, severe work, both of body and mind, is going on. Many difficult and perhaps distasteful things have to be learnt, and vigorous games are being played, involving a considerable consumption of nervous energy and large daily tissue-waste. This must be made up by a copious and well-arranged dietary; and as regards the feeding of boys and girls at day schools, we may trust parents to do the best for them that the means at their disposal will permit. Much of what is known as educational pressure is due to the forcing of half-starved brains up to a level of intellectual attainment

designed for average mental powers, and we will elsewhere direct the attention of our readers to this important subject, and to the means which have been so successfully adopted in various localities for the supply of cheap nourishment to those who would otherwise have to do their work on empty stomachs.

If domestic economy has not to be practised at the expense of the rising generation, fathers and mothers will soon find out the best and most wholesome food for their children, and we may impress upon them the importance of attending to variety, palatability, and above all to regularity, too long intervals not being allowed to elapse between meals. Simple fare well prepared being provided, want of appetite either means that children do not like their food or that they are out of health, and the common sense of parents and doctors may safely be trusted to find the appropriate remedy. When parents are obliged to hand their boys and girls over to the domestic superintendence of educational authorities, and when they pay a handsome sum for their board, they have a good right to expect, not only a fair amount of home-like supervision, but good food and plenty of it. The cheap establishments which Dickens both happily and truthfully satirised in Dotheboys Hall are probably not yet extinct, and

of course when the terms demanded are ridiculously below what is necessary to do justice to the pupil and provide a fair margin of profit to the master, we all know what the result must be. Chronic starvation, impaired health, bad work, lowered morals, and a hatred in after life of everything that was taught under such conditions, are evils which will be avoided if parents will agree to keep their children at home, unless they can send them to a really good school. But when their choice is not restricted by financial considerations, then let them look sharply into everything, and see, above all, that the laws of health are attended to as well as the laws of learning, and particularly that a reasonably scientific scale of dietary is furnished.

It is not so very long since the food at some of our best public schools, in spite of the heavy payments made to house-masters, was often coarse and unappetising, and so insufficient in quantity, and so badly arranged, that the ordinary fare had to be largely supplemented by private purchase. We do not mean to say that matters have yet reached perfection, but active attention is now directed to the subject, competition runs high, and educational authorities are becoming fully aware of the elementary fact that good work cannot be expected from ill-nourished

brains. They are therefore beginning to study the question with some care and reduce their theories to practice somewhat according to the following programme :—

First lesson will probably be at 7 or 7.30. The boys will rise at 6.30 or 7, and it should be a law unalterable as those of the Medes and the Persians that no work should be done on an empty stomach. Some light nourishment, such as a cup of coffee or glass of milk and biscuit, should be made compulsory, and it should be the duty of some one to see that the boys really take it, and do not shirk it on occasions when they are rather more hurried than usual over their dressing operations. Breakfast comes at 8.30, and should be a substantial meal, to repair the wants of the system after the prolonged interval of fasting during the night. Little children, probably, do not require meat once a day, but growing lads, working hard both with brain and muscles, require a liberal allowance of nitrogenous food, and will hardly be satisfied with the old-fashioned breakfast of tea and bread and butter. To these must be added something of a more nourishing character, and actual flesh may be frequently varied by fish, bacon, or eggs, which need not be in large quantity, but good of its kind and well prepared. Coffee is

better than tea, because it forms a convenient vehicle for milk, and great pains should be taken that the bread and butter which form the staple of this meal should be the very best procurable. Dinner follows at 1 ; and we may again point out that boys, whilst not desiring a continual round of stimulating luxuries, agree with their elders in preferring to have their food appetising and properly prepared, and most particularly resent that monotony which, happily, is becoming less characteristic of our national fare. It is not, of course, an easy matter to provide much variety under the ordinary circumstances of school life, but the perpetual roast joint may sometimes be boiled or baked or stewed, meat pies and Irish stew and various hashes may be given from time to time, and the opportunity should not be neglected of proving how good a thing cold meat really is, in spite of the social obloquy to which it has for so long been subjected. We have already spoken of the great dietetic advantage of vegetable soups and of stewed fruit and of green vegetables, which keep up the balance, so important to be maintained, between nitrogenous and non-nitrogenous food. As Dr. Dukes says:—
‘ Directly we get excess of nitrogenous food and deficient vegetable food, boys will be sure to explode with something, skin eruptions, boils, &c., but even

a small amount of meat, if no vegetables be taken, will produce the same result.'

The strongest argument, however, in favour of an abundant supply of fresh green vegetables is this, that if they are banished entirely from the diet scale, either by accident or by design, scurvy is certain to appear. The major forms of this terrible disease are rarely met with nowadays, but miniature types occur much more frequently than is generally supposed; and when boys grow pale and flabby, when they readily bruise when struck, and when their gums are spongy even to the smallest degree, then our suspicions should be aroused, and we must direct our treatment accordingly. And this will not be by drugs alone, but by ordering the consumption of such things as will supply the vegetable acids necessary to keep up a healthy quality of the blood, the most available being cabbage, spinach, potatoes, watercresses, oranges, lemons, and salads, which are cheap and popular, and may be used in great variety according to the season of the year.

It is, of course, quite inevitable that boys who like to ape the customs of manhood will grumble at their food, and will often adopt a critical attitude even more pronounced than that affected by those who are real judges of the gastronomic art. Possibly they

are accustomed to a specially luxurious table at home, more probably they find fault because others do so, or in order to impress others with a sense of their own importance; but this tendency will be held in check if the master and his family are present at dinner-time. It is difficult for a lad to complain of his beef or mutton when he sees the proprietor of the establishment calmly feeding off the same joint, and keeping a vigilant eye on the general arrangements. This constant supervision will ensure that proper cooking is enforced, the meat being neither hard and dry or underdone, and that it is decently carved, not cut up in irregular masses, but sliced down with as much care as though it were to supply the wants of a fashionable dinner-party; and he can also see that the boys keep up a proper standard of manners, hold up their heads, eat with deliberation and without bolting their food, and altogether attend to the customs of good society which they have probably acquired at home.

Tea is of course a light meal; and the gastronomic programme is wound up by something before going to bed, consisting either of bread and cheese and beer, or of porridge and milk, the latter being often the more popular of the two.

Eating between meals, gastronomic nipping,

must be carefully discouraged, and the medical officer will soon learn to recognise the symptoms due to gluttonous excess, occurring most commonly towards the beginning of term, before the supply of pocket-money has begun to run low; and, as tending to lessen this pernicious habit, house-masters ought to prohibit the sending of hampers stuffed with indigestible dainties from home. Appeal to the common sense of boys will usually succeed in persuading them that digestion can only be thorough and efficient if food be taken at regular intervals; but if any difficulty is experienced on this score, tell them that such regularity is essential to success at cricket and football, and dietetic regulation will at once assume a real importance in their eyes. For the great passion at that time of life is to be in a perpetual state of modified training, and a few hints on the physiology of eating will not only be keenly appreciated, but will tend to keep their wants and desires within reasonable bounds.

The medical officer will frequently be consulted by boys under his superintendence as to what is the best diet for training, and he will often find that before asking his advice they have voluntarily submitted themselves to some one or other of those fantastic schemes which are still in vogue among

athletic authorities. They cannot, of course, very well indulge their desire for raw meat, but they can bravely endure the agonies of thirst, lest they should 'increase the internal fat,' and pies and puddings and sugar are forbidden luxuries, the very mention of which makes them shudder. It will probably be found that mutton is preferred to beef, that green vegetables are forbidden, that coffee is drunk rather than tea, that bread must be sparingly consumed, and that there is hankering after glasses of port wine or of old ale. They will probably be much distressed and not a little incredulous when they are told that many of the mysterious regulations of the trainers are superfluous, and that, however necessary it may be to enforce a strict diet regimen on professional athletes who tend to lead irregular lives, or even on university men, schoolboys are compelled to live with such scrupulous care that it seems difficult to improve much on their ordinary code of daily routine. Training is, of course, nothing more or less than keeping the bodily frame in the best possible condition for performing with rapidity and certainty various bodily movements which would possibly injure and certainly exhaust those who are not accustomed to much active movement. It has been found convenient to prescribe a certain regulated routine of

daily exercise, so that the heart and the lungs and the nervous and muscular structures may act promptly and harmoniously when called upon to undertake rapid and long-continued effort, without leaving bad consequences behind. And in another chapter we will consider this subject at greater length. What should be eaten and drunken at such times is rather a matter for common-sense consideration than for any mysterious special knowledge, the great object being to furnish to the system at regular intervals, and in compact and digestible form, such nourishment as will supply the rapid waste of the nitrogenous structures, and enable force to be evolved with energy and freedom. A schoolboy who gets plenty of sleep in good air, is well fed and not overworked, and plays at games vigorously all the year round, may be said to be in a perpetual state of training, and hardly requires to adopt any particular system. But he is sure to have picked up from books or ignorant people some fantastic notions about diet, and these should be dispelled as quickly as possible.

1. In the first place, if he could have his choice, he will be found consuming with ill-concealed disgust almost absolutely raw meat, which he believes to be far more sustaining and strengthening than that which has made the acquaintance of the kitchen fire.

Undoubtedly over-done muscular fibre is hard and tough and indigestible, but if the happy medium can be hit off, the joint or steak is doubly appetising when it is bathed in the natural juices which judicious cooking evolves than when a miserable dab of stringy and bluish flesh is sent up in a condition strongly suggestive of a visit to the Zoological Gardens. Besides which we must not forget the possibility of involuntarily becoming the host of tapeworm or *trichina spiralis* by eating raw meat.

2. In spite of the dogmatic assertions of trainers to the contrary, fat and sugar may be freely taken, as they present the type of food most valuable to those who wish to store up energy as well as to sustain the animal heat. Pastry must, however, be discouraged, simply because butter and flour and other ingredients in that form of combination are by no means readily digested.

3. Mutton is probably a little more quickly digested than beef, but the difference is not great enough to make any special preference necessary, but both may be recommended rather than ham or pork or veal, whilst game and fish and poultry may conveniently vary the bill of fare. Cheese seems rather out of favour with trainers, but is an excellent food for those taking much active exertion, and Swiss guides

invariably bargain for a supply when they are about to undertake a laborious piece of work. Bread may be eaten as usual, butter is a convenient way of taking fat, and fresh vegetables should always be taken with dinner.

4. An old 'fad' of trainers used to be that drink must be restricted as much as possible, because it produced 'internal fat,' and thus impaired the wind. No one, however, has ever been able to demonstrate where this dreaded internal fat is placed, and its existence being mythical it is not, therefore, necessary to guard against its accumulation, fluid being allowed in due quantity to repair the wants of the system. If violent exercise is being taken, much perspiration, probably, is the result, and the daily loss will considerably exceed the five pints given off under normal conditions, sensations of thirst indicating the necessity for replenishing the fluidity of the blood. The warning may not, however, be superfluous that much more real relief will follow repeated sips than deep draughts, which are apt to cause flatulence and digestive discomfort. We have already mentioned the faith reposed by some authorities in port-wine, old ale, or sherry beaten up with egg, but the experience of Weston and other pedestrians, and the results obtained in the Ashantee and Red River

campaigns, have shown that hard bodily exertion is better done without alcohol. If any stimulant seems to be required, let it be taken with the last meal in the form of a little light beer. Tea and coffee may be freely used, and there seems no valid reason why one should be preferred to the other.

Let us now sum up the gist of our subject into a few propositions.

1. Children during school life must be well fed, for not only is growth rapidly going on, but there is great wear and tear of mind and body both in work and play. If they are not properly nourished at this critical time they develop badly, their bones are ill set, their joints loose, their teeth deficient in enamel and prone to decay, their blood poor and watery, hereditary tendencies are encouraged, and they become thin and narrow and stunted men and women. In ill-fed schools we find the constant occurrence of skin disease and ophthalmia, and scrofula; epidemics are constantly breaking out, and the educational standards which are fairly within the mental grasp of average minds distinctly overwork the feebly-nourished brains of the scholars.

2. In arranging our scheme of diet we must study variety and palatability and regularity; we

must see that no dreary monotony prevails, and that too long time is not allowed to elapse between meals. Children should not go for more than three or four hours without something to eat, but this need not be more than a biscuit and a glass of milk when it is meant to bridge over the interval between dinner and tea. Meat once a day is sufficient for the very young, but above the age of eight it is well that the allowance at dinner should be supplemented by something of a nitrogenous character either at breakfast or supper, and preferably at the former meal. Good cooking and carving and decency of service are well deserving of consideration, and we must not forget the necessity for plenty of green vegetables and well-cooked fruit. Stewed apples, or pears, or rhubarb, or currants, or raspberries, or gooseberries may alternate in the bill of fare with jam tarts and pies, and simple puddings, the popularity of which may be greatly enhanced by the addition of some wholesome preserve.

3. Fat is very important for the purpose of evolving force, keeping up animal heat, and furnishing the basis of cell nutrition; and if it cannot be digested in the crude form, as is often the case, we must seek to supplement the deficiency by bacon, butter, suet puddings, cream, or even by cod-liver

oil, which children often take with an avidity altogether inexplicable to their elders.

4. Sugar is also very valuable, and its use may well be encouraged in a great variety of forms. The crowded confectioner's shop may really be an indication of the wants of nature, and if boys are furnished with a reasonable amount of this essential dietetic agent as a matter of routine, they will be less inclined to waste their money and injure their digestion by the indiscriminate consumption of ices, pastry, and unwholesome gastronomic pick-me-ups at irregular times and seasons.

5. Good milk is all-important, and attention should be paid to the purity of bread, and we would strongly recommend the use of whole-meal flour as recommended by the Bread Reform League. The modern process of decortication removes the outer and irritating envelope from the grain, and leaves the inner part of the husk, which contains all the constituents of the corn, and notably the phosphates of lime and magnesia which are very requisite for keeping up the bony skeleton. In the over-white bread commonly sold by our bakers we lose all this, and a valuable element of nutrition must therefore be made up in some other and perhaps less convenient way.

The preceding remarks have referred almost exclusively to the case of well-to-do children, and to the necessity for wise and liberal dietetic arrangements during the period of school life. Educational overpressure is almost unknown among well-fed brains, but there can be no doubt of the disastrous results caused by a very moderate amount of work when adequate nourishment is not taken to repair waste. Let us take the case of a poor little boy or girl, tumbling out of bed on a cold winter morning and 'creeping like snail unwillingly to school' without even the faintest apology for breakfast. Most probably the dinner of the preceding day had been of the most scrappy and insufficient nature, lessons have to be learnt anyhow amid noise and dirt and squalor, and after a night of disturbed sleep the poor little victim of the inequalities of our social life must hurry away to school cold and hungry and miserable, and try, too often in vain, to comprehend what is going on. To remedy this sad state of affairs attempts have been made very successfully to provide a hot dinner at very trifling expense, the first experiment being made by Sir Henry Peek, who at Rousden in Devon arranged that every child in attendance at the Board School should have a comfortable meal for fivepence a week. In country districts the evils we have been

attempting to describe are not so acute as in large towns; there is generally porridge and milk for breakfast, and something is given the child to eat in the middle of the day; but it is quite evident that an agricultural labourer, with a weekly wage of ten or fifteen shillings and a large family to support, cannot afford to get more than the very barest necessities of life, and a piece of dry bread is probably all that he can put into the pockets of his little boys or girls when they trudge away to school. Perhaps they have a mile or two to walk in all weathers; they work hard for five or six hours, and when they reach home there is probably nothing better for them to eat than another crust of bread, and even that in scanty quantity. Can we wonder that under such physical conditions some kind of breakdown is too apt to ensue.

Another very interesting piece of evidence in connection with this subject has been furnished by Mr. J. A. Campbell, M.P. for the Universities of Glasgow and Aberdeen, who describes the arrangements by which an excellent hot dinner was provided in the school of Farnell Brechin for a halfpenny a head. 'By private gifts and subscriptions the plant of the soup-kitchen was provided. It consists of a boiler erected in a wooden building which serves as the

teachers' washing-house, a couple of large tin cans, one or two ladles and other utensils, and 120 strong tin bowls. The bowls cost about 3*l*. Mr. Cameron estimates that the whole necessary "plant" for a similar school may be obtained for about 7*l*. Gifts of vegetables, meat, &c., to the value of about 10*l*. were received from parishioners, and a sum of 3*l*. 5*s*. was paid by the School Board in wages to the cook; the financial result of the transaction being a balance of profit of 5*s*. 3½*d*., and an additional grant of 10*l*. earned by the school for increased attendance. The effect on the physical condition of the children has been most marked.' Mr. Howard, Inspector of Schools, writes with reference to Sir Henry Peek's experiment:—'What strikes one at once in coming into the school is the healthy vigorous look of the children, and that their vigour is not merely bodily but mental comes out in the course of examination. There is a marked contrast between their appearance and their work on the day of inspection, and those of the children in many of the neighbouring schools. The midday meal is good, and without stint. It acts as an attraction, and induces regularity of attendance.' And the Rev. Mr. Cameron, the parish minister of Farnell, gives his opinion that 'there can be no doubt of the physical advantage to the children seen

in the absence of any serious epidemic or illness among them, from which other schools in our neighbourhood have not been free, and in the buoyancy of their spirits. This latter is wanting for some time, so the teachers tell me, after the dinner is stopped.'

The actual material of the dinner varied somewhat in different cases. At Rousden apple puddings, boiled rice and jam, bread, jam, raisin^d, and currant puddings, alternating with roly-poly meat puddings, and soup, form the staple fare, whilst at Farnell soup is principally provided, 'the rotation being pea-soup, potato-soup, and Scotch broth. In all of these vegetables are largely used, and pieces of meat are boiled down. The soup is made both palatable and nourishing.' But in fact it matters comparatively little what the precise composition of the bill of fare is, for of course managers must be largely guided by convenience and considerations of expense, and must only endeavour to get the most substantial meal they can provide for their money; and they will be amply rewarded for their trouble by the marked and rapid improvement in the health, spirits, and capacity for work of the children under their superintendence, and by the reflection that they are contributing in no small degree to the

better physical development and intellectual growth of the coming generation. We may also refer to excellent results obtained by Lord and Lady Aberdeen in Aberdeenshire.

It will be observed that the arrangements which we have just described have been conducted on the principle of a certain small payment sufficient to cover the actual cost, and that no pauperising element is therefore introduced. But it is of course quite evident that the parents of some school children are unable to make any contribution towards providing this midday meal, and that charity must step in to supply the deficiency. Many benevolent people are now at work in the East End of London, striving to prevent the damage which compulsory education must inflict on ill-nourished brains, and it is impossible to conceive any direction in which the contributions of those who wish to do some good in their generation can be made to flow with greater hope of useful results.

III.

SCHOOL WORK.

EDUCATION is of course, in its widest sense, a life-long process, but its essentials are squeezed into the period of youth, when the mind is fresh and the receptive faculties are vigorous and keen. When the infant first opens its eyes in the world it begins to learn. Everything is strange and new; it has to make the acquaintance, so to speak, of its senses, and to acquire the art of using with precision and with ease those five gateways to knowledge. Every impression that strikes on the retina, every sonorous vibration that enters the ear, must be received and informally analysed; touch is called in to verify what has been seen and heard, taste and smell are early gratified, and the apparently purposeless cooings and crowings of infancy are perhaps nothing more nor less than attempts to exercise the organs of speech. Standing and walking must next be mastered; the muscles must be co-ordinated into

harmonious action before the tottering gait of the child is translated into the firm tread of later years, and with the acquired power to say a few words the first stage of education terminates. The most intense and active period of mental receptivity is now about to begin. The senses are in full working order, the child can verbally express its surprise and delight, and it can ramble freely about in search of novelty; observation is brisk and rapid, the desire for information is insatiable, inconvenient explanations of every natural phenomenon are desired, and the why and the wherefore is invariably demanded with a ruthless infinity which often sorely tries the knowledge and the patience of parents. Undeterred by rebuffs, unable probably to understand why little boys should not ask questions, or why they should wait until they are grown up to be told about things which enter largely into their present lives, they return again and again to the charge with a perseverance hardly appreciated by their seniors. Attempts at intellectual repression are rarely successful at this time, and the flimsy pretence of superior knowledge in the abstract which cannot descend to the mental level of the interrogator soon loses its effect. The only proper course, if parents or governesses and nurses wish to retain the full respect of their charges, is either to

take pains to study the questions put to them and return an intelligible answer, or boldly to confess their ignorance, and say that they do not know what is asked. This is the plan recommended both by honesty and common sense, and it will be found to 'pay' by far the best in the end.

About this time an enormous mass of information may be acquired quite naturally in the progress of every-day life. The country child picks up some familiarity with plants and stones and animals, and it is perfectly easy to graft on to its own observations some little useful detail of botany or natural history, whilst the town mouse's intellects are sharpened by much that it sees and hears, and they are both insatiably greedy to know more. But something more than the actual knowledge of things is now acquired. The formation of the character is begun at this time, and according as the soft material is run into a good or a bad mould depends in great measure the future morale of the man or the woman. Up to this point there is not a very substantial difference between the future Milton or Bacon and the dusky pappoose of the red Indian, but hereafter their walks in life diverge at a very acute angle. The savage grows up with a well-developed frame, able to spend days and nights on foot and to use his eyes and ears with a

skill and certainty little short of marvellous, but his mental stature is dwarfed and stunted. Good although some of his instincts undoubtedly are, the absence of early pruning has permitted a luxuriant crop of those evil tendencies which lie dormant in us all, and we accordingly find cruelty and revenge and superstition and treachery too often obscuring the higher qualities of his nature. And were we permitted to grow up without religious knowledge or intellectual training, we should probably not only emulate his deficiencies, but probably superadd some of the vices peculiar to our own boasted state of civilisation. It is here that the precept and example of sensible parents step in, and by firm and judicious management and care correct any tendency to such deplorable results by inculcating a high morality, and by making duty, order, and discipline the ruling motives of life.

Children are naturally selfish, and the conditions under which they begin their existence are certainly not calculated to repress any leanings in that direction. When a baby appears on the scene, more especially if it be No. 1, we need not remind our readers of the adulation, the almost fetish worship, with which it is surrounded by the feminine portion of the community, the Aladdin-like celerity with

which every wish is gratified, the way in which the whole household is subordinated to its tyrannical sway. For some months this desirable condition of things is prolonged, and the ruler of its own little universe becomes convinced that its will and its desires must remain paramount, and that a fit of crying or a gesture of impatience will bring all its subjects to its feet. There must of course be a rude awakening from this happy dream. Perhaps a successor arrives, to whom the fond attentions of mothers and sisters and aunts are transferred, with perhaps diminished fervour; but in any case our young friend must now be taught that he is no longer master, that he must give and take and share his pleasures with others, and fit into his place as a probably subordinate member of the community of which he forms part. He will now find that all goods are not held in common, that he must ask for what he wants, and very often have to encounter refusal communicated in terms which he may think harsh and unsympathetic. His natural instincts are towards cruelty and bullying; he would like to pull the wings off flies, to kick or beat dogs and cats, and to domineer over his younger brother, but he gradually finds that these are forbidden luxuries, and discipline is now learnt by oral instruction, aided when required by the

judicious use of corporal punishment. Truth and honour and justice are quickly acquired if he has a good moral nature to work upon, and under such a system of training, reinforced by the example of his brothers and sisters, should he be fortunate enough to have any, the seeds of future development as an honest and upright man are now sown in the virgin soil.

A great disappointment, however, occasionally awaits parents. They may find that, in spite of all their care and anxious thought, one or other of their children will grow up with some strange moral twist for which they are quite unable to account. Perhaps it may be an inveterate tendency to untruthfulness, or a deceitfulness of nature quite foreign to the rest of the family—a something which quite spoils the character and gives rise to anxiety and alarm. The reason is usually not far to seek, and fathers and mothers are really directly responsible for the peculiarities which they deplore. During the most susceptible period of children's lives they are often forced for many hours of the day into the exclusive companionship of servants, who may just as likely as not be dishonest and deceitful, and at all events almost necessarily deficient in the lighter traits of moral delicacy and social polish. We are sometimes sur-

prised to find a highly-bred child dropping its *h's* with a calm unconsciousness worthy of 'Arry' from the East End, and it is of course perfectly clear that it has picked up the bad habit in the nursery. But worse things than this are often ingrained in the same way in the character by what the child hears around it and the generally turbid moral atmosphere in which it spends some of its time; and very great care should therefore be taken before appointing a nursemaid to her very responsible post. Parents should have their children with them as much as possible at this time, and this is surely one of the cases in which lady helps would be of use by substituting delicacy and refinement in the nursery for the vulgarity and coarseness which too often reign supreme there.

Reading and writing are generally learnt with some eagerness, because the child sees the wealth of pleasure which books can give, and of which the key has hitherto been held by others. But other things speedily follow, and now some of the most real and pressing difficulties of life begin. Freedom is now over, regular lessons have begun, the joyous rambles in the open air, and the pleasant period when a retreat can always be made from the realities of the world into an imaginative realm of

dreamland, are rudely interrupted by the establishment of stated periods when quiet and order must be observed, and when all the faculties of the tender mind must be focussed upon some new and perhaps distasteful set of ideas. Specific things must be learnt, and this may be either most enjoyable or distressing in the extreme. Sharp and clever children delight in acquiring knowledge, they feel pride and satisfaction in outstripping their competitors, and they are eager to learn all that can be learnt. The drag must be put on them, and they must be restrained in their activity, more especially as it too often happens that mental precocity is associated with feeble bodily powers. But alas for the dull and stupid and backward! Many of the young who are by no means deficient in native sagacity run into educational grooves with great difficulty, and revolt on all possible occasions at the necessity for some forms of mental training. They may delight in history and geography, but perhaps cannot endure grammar, and are driven fairly frantic by fractions and the rule of three; but these things must be mastered, and so much goes temporarily out of the brightness of their lives. Perhaps their teachers lack the gift of sympathy, and, not having enough imagination to put themselves in the place

of their scholars, they are apt to condemn them as stupid and obstinate because an explanation which has been sufficient for others has not hit off the quality of their minds. To this want of intellectual sympathy must be ascribed some at least of that artificial stupidity on which Mr. Brudenell-Carter has written so well, and that distaste for learning in all its forms which is so often consistently maintained in after life. About this time the wary parent must keep his eyes open, and should hold occasional consultations with the trusted family doctor, for there are breakers ahead, and various grim enemies dog the path of their little ones. They must remember that during this early period the bodily frame is rapidly growing and developing, and that one large and tender organ which receives a very considerable proportion of the whole mass of blood is being brought for the first time into full and regular work. Its functional activity is now being rapidly developed; this means the frequent influx of large quantities of blood at certain stated intervals of time, and under anatomical conditions specially favourable for periodical congestion.

It is surely hardly necessary, then, to insist that this process should be carried on gradually, that the unfolding of these delicate cerebral cells should be

effected with deliberation, and that nothing should be allowed to interfere with the building up of a sound constitution. A sharp look-out more especially must be kept for persistent frontal headache, for dulness and languor and listlessness, and most of all for any departure, however slight, from the brightness and vivacity of childhood, for depression or sleeplessness, or what has been termed old-fashionedness; and if any trace of these symptoms concur with the least loss of flesh, then let all work be absolutely struck off, and perfect rest in good air most strictly enforced. For the dread reality of tubercular meningitis may be going to cast his grim shadow before, and it is surely far better to act on an erroneous suspicion than to do the child the irreparable damage of spurring on mental powers already overdone, and to have to bear the bitter disappointment of seeing the infant prodigy develop into a dull and conspicuous failure in after life. A few years thus lost are afterwards quickly made up, and, acting on this principle, we would urge parents not to hurry their children into lessons after any acute illness, but most especially after scarlet and enteric fevers, which leave the mental powers often for prolonged periods blunted and feeble, rendering continuous application difficult and attended with a painful sense of effort. Any

attempt to force on the brain at this time can only do harm, and a long holiday of complete idleness will really prove to be the best economy of time.

Well, then, for good or for evil the child is now embarked on its educational career, and as a general rule we may affirm that it is beginning to grow beyond the reach of purely domestic guidance. Some soft-hearted parents, and most especially mothers, would like to see their boys always at home, and brought up by tutors under their own direct supervision. We doubt if this is often a complete success. The authority of resident instructors is seldom absolute, and the mistaken laxity of parents does not always back it up to the full. It is, of course, impossible that one man can be an expert in every branch of knowledge, and so the time must inevitably arrive when children living in the country must be sent away to school. Residents in large towns may be sufficiently well trained at the numerous excellent day schools which may there be found, and this plan has the merit of economy and convenience. Until quite lately the English public system was comparatively little known in Scotland, and yet it would be difficult to find a country where all ranks in society were more soundly and thoroughly educated, or with greater regard to their ultimate success in life.

No doubt it saves much worry to get rid of troublesome boys from the house, but if parents can afford the time and trouble, what greater privilege can they confer on their children than allow them to grow up at their side, profiting by their example and enforcing their counsel and support? Of course, in fashionable life, when domestic responsibilities must make way for social pleasures, such an arrangement is clearly out of the question, and children are looked upon as incumbrances to be kept out of the way as much as possible. But in the middle classes, where more domestic lives are led, and where the income can hardly bear the strain of sending two or three boys away from home, a very practical and sufficient education can often be procured at very reasonable cost. Always remembering the weak points of private-school life, the chief of which are the difficulty of enforcing compulsory exercise when children are lazy and sluggish, and the tendency of the more ambitious and active-minded to overdo evening preparation.

Sending boys away to a cheap public school must be a very doubtful experiment in most cases. The best class of masters cannot be obtained, and the tone of morality among the boys is apt to degenerate; and as the feeding and general hygienic arrangements

must of necessity be second-rate, health inevitably suffers at the most critical period of life. But the more expensive and perfectly conducted establishments nowadays leave little to be desired, although unfortunately they are luxuries which only the wealthy are able to afford. It is no part of our business to recommend any one of these rather than another, but a certain number of them supply the form of education which on the whole suits boys best, and gives them the most likely chance of turning out well in after life. The moral atmosphere is usually good, or at least as good as it can be made where large numbers are collected together and necessarily removed from exact individual supervision. Honour and justice and discipline are learnt, and stupid self-consciousness and silly conceit are eradicated by the wholesome process of finding his own level among others who are seldom respecters of persons. Boys are generally enthusiastically fond of their old school, and their pleasant recollections can nowadays be heightened by the feeling that they have really learnt something there which may be of practical use. Education, of course, means in part the preparation of the mind by careful training in the best schools of method for the more specialised things which must afterwards be learnt, and it was formerly

held that the only way to do this was through the medium of certain forms of study the actual utility of which was extremely limited. The term 'culture' being an agricultural one, the old-fashioned educationalists believed that the ground could only be properly manured by the dry bones of the past in the shape of Latin and Greek, which were then mercilessly crammed into the passive brains of the victims. Everything else was held to be not only superfluous, but a mere waste of time, and school arrangements were planned accordingly. Many boys, however, did not by any means look at matters in the same light, and could see no charm in the classical books which they were compelled painfully to spell out word by word, with but very partial conception of their meaning.

They not unnaturally felt that the feeble smattering which their time and opportunities could give had furnished them with no real hold on the structure of the language, nor any effective insight into its beauties, and most especially did they rebel against the dreary custom of constructing Latin verses in a way which only made too plain the hopelessness of the effort to excel in such a difficult accomplishment. As Sydney Smith says, 'The prodigious honour in which Latin verses are held at public schools is

surely the most absurd of all absurd distinctions. You rest all reputation upon doing that which is a natural gift, and which no labour can attain. If a lad won't learn the words of a language, his degradation in the school is a very natural punishment for his disobedience or his indolence; but it would be as reasonable to expect that all boys should be witty or beautiful as that they should be poets. In either case it would be to make an accidental, unattainable, and not a very important gift of nature the only, or the principal, test of merit.'¹

But the climax came when he left school. If he were proceeding to the University well and good; he has been travelling, if somewhat slowly, along the right line; but if he were destined for some more immediately practical career, he will have only too much occasion to lament the fantastic nature of his up-bringing. His father storms and fumes when he contemplates the additional expense involved in grinding the finished schoolboy up for any future examination, and he himself becomes depressed and annoyed when he reflects how many golden years he has partially wasted on dreary and unprofitable pursuits. As Farrar puts it—and I presume his remarks apply rather to former times than the

¹ *Too much Latin and Greek.*

present—‘As far as mere intellectual equipment is concerned, an ordinary boy who leaves in the low form of a public school, at the age of sixteen or seventeen, has received the worst of all possible educations.’

To quote Huxley, who has done more than any one to infuse a more healthy tone into education: ‘At the cost of from one to two thousand pounds of hard-earned money, we devote twelve of the most precious years of your lives to school. There you shall toil, or be supposed to toil; but there you shall not learn one single thing of all those you will most want to know directly you leave school and enter upon the practical business of life. You will in all probability go into business; but you shall not know where or how any article of commerce is produced, or the difference between an export or an import, or the meaning of the word ‘capital.’ You will very likely settle in a colony; but you shall not know whether Tasmania is a part of New South Wales, or *vice versâ*. Very probably you may become a manufacturer; but you shall not be provided with means of understanding the working of one of your own steam-engines, or the nature of the raw products you employ; and when you are asked to buy a patent you shall not have the slightest means of judging whether the inventor is an impostor who is contra-

vening the elementary principles of science, or a man who will make you as rich as Croesus. You will very likely get into the House of Commons, you will have to take your share in making laws which may prove a blessing or a curse to millions of men; but you shall not hear one word respecting the political organisation of your country; the meaning of the controversy between free-traders and protectionists shall never have been mentioned to you; you shall not so much as know that there are such things as economic law.

‘The mental power which will be of most importance in your daily life will be the power of seeing things as they are without reference to authority, and of drawing accurate general conclusions from particular facts. But at school and at college you shall know of no source of truth but authority, nor exercise your reasoning faculties upon anything but deduction from that which is laid down by authority.’¹

Common sense and public opinion, however, have fortunately combined to make very practical changes in this old-fashioned routine, and a wholesome variety of work is now encouraged which renders education a far more physiological process now than formerly. The regular use of any organ or tissue, as we have

¹ *A Liberal Education and Where to Find It.*

already seen, is necessary for its sound development and healthy function, and the brain is no exception to this general law. When properly and reasonably exercised it will no doubt live longer and better than when it lies fallow in torpid sloth, and it will do its work quicker and more thoroughly when variety is allowed and when the allotted task is congenial in character. Many people find their best rest from intellectual strain to consist not in absolute idleness, but in a thorough change of idea and association to something else which may not be easier or less laborious; and the schoolboy of to-day, if his talents do not find congenial scope in the classics, may fly to the modern languages and seek refuge on the modern side. Every public school worthy of the name now provides an excellent practical training in French and German, and on speech-days we generally have the opportunity of seeing how well the boys have profited by their opportunities for acquiring a correct accent. There is always a well-appointed laboratory where chemistry is thoroughly and experimentally taught, and where instruction in natural science is given and a taste for botany and geology and natural history is directly encouraged by frequent field excursions. Music now takes a prominent place in the curriculum, and not only are the piano

and violin and other chamber instruments extensively cultivated, but regular bands are formed which play with much spirit and effect. The study of modern history and geography and political economy is no longer neglected, and opportunity is given for the consideration of public questions and for acquiring the art of public speaking in the debating societies which are now so popular at our public schools.

Work has therefore become far more congenial and therefore far more tonic in its effects because it is now conducted with some reference to the future career in life. If a boy wishes to take up school-mastery, or if it seems to his advisers that he is likely to take a good degree at the University, by all means let him stick to his Greek and Latin and mathematics, and manufacture verses to his heart's content. But if his inclinations tend to trade or commerce, he will naturally be interested in more practical things, and if medicine or science be his goal, he will appreciate the opportunity now afforded him for training his faculties of observation at an age when they are sharpest and most impressionable.

Altogether the progress made since 1868, when Professor Huxley delivered his address, is most remarkable and gratifying; and although it is no part of our business to discuss the actual problems of

education, we have thought ourselves justified in making these few remarks from the physiological and hygienic point of view.

Discipline must always be an anxious consideration with schoolmasters, for although but little difficulty will be experienced as a general rule, emergencies will now and then occur which demand the utmost exercise of tact and diplomacy.

The English people are probably the most orderly and peace-abiding nation in the world, because they are the best governed and are free from the tyranny of an absolute monarchy and the meddling supervision of an irritating officialism permeating their daily life. Our crowds are the most easily managed, our soldiers and sailors the best disposed, and the general mass of the population the most contented with their lot, because they are treated like reasonable human beings, and not crushed into an outward compliance with a stern despotism from which they now and then make desperate efforts to escape. We see that students abroad join secret societies and conspire actively against the existing order of things, and severe measures of repression are often considered necessary. Luckily at home their thoughts turn towards more appropriate things, and any decided political or social convictions which possess them

find harmless expression at the debating societies which are established at all our Universities and public schools.

The habit of discipline which comes to us so naturally in after life is a lesson learnt in very early childhood—almost as soon, in fact, as the babe makes its first struggling locomotive experiment from its mother's lap. It then finds out that there are other people to be considered besides itself, that it must not always expect to be helped first, or to take the best place, or to be the sole object of consideration on all occasions—in short, it must unlearn a good deal of what injudicious indulgence has taught. The lesson is perhaps not altogether a very pleasant one, but it is as bracing as a shower-bath, and it is carried on under domestic guidance directly and indirectly until school time is reached.

With this new phase of life comes the necessity of falling into the ranks along with many others, and being bound by a code of rules and regulations which may seem at first narrow and interfering with due liberty, and the punishment for which may appear disproportionate to the offence. The force of example will do a great deal to persuade even the most unruly loyally to accept a system the advantages of which they will be the first to admit in after

life ; and one advantage of the public-school system is that a good deal of responsibility is left in the hands of the bigger boys, and that the sixth form has a certain moral influence in keeping order and showing a good example. Without some arrangement of this kind bullying and tyranny would become general, a reign of terror would make the very existence of the weak a burden to them until in the fulness of years they succeeded to the position of the strong and were able to hand down the harsh traditions under which they had been brought up.

Anything like systematic cruelty or oppression is now rendered difficult by the protecting eye which the big boys are expected to cast over the small, and the system of fagging so much dreaded and denounced by inexperienced theorists is really a most valuable substitute for that theoretical equality which is impossible in a large school. In return for certain small menial services, which are much fewer and lighter than are usually supposed, and which are cheerfully rendered, the fag may claim the protection of his master, may obtain his help, and nearly always secures his friendship ; so that, whatever may have been the case in former years, there is little or no abuse of the custom nowadays.

The *Journal of Education* for 1877 contains a

very interesting ‘boy’s account of fagging,’ which we cordially recommend to the attention of our readers, as it effectually disproves many of the loose and random assertions made by half-instructed people; and my friend Mr. W. H. Bolton, an old Rugbeian of distinction and experience, has favoured me with the following very practical remarks:—

“‘Fagging’ exists at all our public schools, varying slightly but not materially in form. The system originated, no doubt, in the natural tendency of big boys to do as little as possible for themselves, and especially to avoid what was unpleasant or irksome, and to compel weaker boys to do it for them. Any one who went in early years to a private school knows, probably by unpleasant experience, how true this was, and how pleasant the change was to a public school, where, although still called upon to perform certain work for his elders, he knew exactly the limit of the duties that could be demanded of him, and those who had the right to demand them. Moreover, his master was subjected to public opinion, and in extreme cases to an appeal to the head-master. There is no written constitution defining the status of a fag, but custom and authority have clearly defined it. At Eton, for example, the fifth and sixth forms, and at other schools the sixth form, or boys

for special reasons invested with the authority of the sixth form, have the right to fag boys who have not attained a certain position in the school. The services required of a fag may be regarded as menial, and therefore by some as degrading; but all public-school men, for the last twenty or thirty years at any rate, would describe them as insignificant. At Eton, for example, beyond the duty of running small errands at the request of any sixth or fifth form boys, the fag has nothing to do beyond being present when his master sits down to breakfast or tea, and possibly toast a few pieces of bread or fetch some delicacy from the neighbouring "tuck" shop. At Rugby and some other schools each sixth form boy has certain study fags allotted to him, whose duty it is to sweep out and dust his study—an operation which, when performed, probably occupies the fag whose week it is five or ten minutes. Most study fags would admit that the whole of their duties during a term had not consumed an hour of their time, while many would say that the service had been merely nominal. It must be further remembered that a boy is seldom a fag for more than a year or eighteen months, when he either attains the exempted status or is sufficiently senior to escape fagging. It will be therefore seen that "fagging" is a very slight infliction, and for the

comfort of those who may still believe that fagging is a species of bullying, or at least liable to degenerate into such, it may most confidently be asserted that the system has a totally different result, and in fact has a powerful effect in preventing the many tyrannical abuses which a short time ago, at any rate, existed in many first-rate private schools. By authorising within well-defined limits the exercise of certain powers of the senior boys over the junior, and by giving the right of so doing to pre-eminence in intellect and not in physique, it has been found that big boys will not so readily arrogate to themselves the right which might gives; nor will small boys submit to the exactions of bullies. The sixth form, moreover, have a strong interest in preventing others from exercising their privileges, and thus, from selfish motives if no others, become the natural protectors of smaller boys. At the same time public opinion prevents anything like an abuse of the powers of fagging, the fags always being supported by the class which have ceased to be fags but are not yet masters. No doubt fagging was not always so mild a form of service, and the system has improved owing to the many things which have softened the life of a small boy at a public school; but probably few things have done more to benefit the small boys

than authorising into a system the rights and liabilities, if they may be so called, which always arise in a large school. At the private school the strongest boys, and especially the idle and good-for-nothings, exact all they can and give nothing in return, whereas at a public school the master is in a certain sense responsible for his fag, and often helps him both in his lessons and play. Many warm friendships have been formed in this way, and kindly feelings been brought into play by the mutual benefits conferred. It seems hardly necessary to enumerate the small errands upon which a boy may be sent, the most onerous of which would probably be to fetch a heavy can of hot water or clean out a saucepan in which his master has made porridge for his supper, but even the latter would be rare, and such a thing as boot-cleaning is no longer known. There can be no doubt that the small boy's bump of reverence towards his elders, and his consideration for those whom either at home or in after life he may be placed in authority over, is increased by the lessons he learns as a fag.

‘There is one other form of “fagging” existing at schools—viz., compulsory games; at some football, and at others cricket, and at a few gymnastics. These come obviously under a different category from menial services; but still it is the boys who impose

the obligation. At Rugby, for example, every boy has to play football, in whatever form he may be, even the highest, if the head of the house adds the words to the notice of the game, "All must come." House runs or paper-chases are also compulsory upon fags unless they prefer to carry the coats of those who run. This compulsion has a great influence in keeping boys occupied and therefore out of mischief, while it forces many boys to take exercise and become proficient in games who, either from timidity or laziness, would not take part in them.

'In these remarks no reference is made to the privileges of the sixth form, more especially at Rugby and schools established in imitation of it, by virtue of which they are responsible for the discipline and morality of the boys below them in the school. That is a subject quite distinct from "fagging," and one upon which a great deal might be said and in fact has been said.'

The subject of punishment is an important one. Even if we agree with Farrar that its necessity is a confession of weakness, it is the weakness of human nature.

Whatever the authority of the head-master and his colleagues may be, and however high the pitch of discipline to which they have raised the school, some mutineers will be found who will place them-

selves in deliberate defiance of all rules and regulations. Corporal punishment is the only way to obtain the mastery over these daring spirits and to prevent their bad example from spreading; and although it is an alternative which should very rarely be resorted to, we fear that an occasional recourse to it will be found absolutely necessary. Elaborate arguments have been directed against it both from the moral and the physical side. We are told that it is degrading and brutal, and that various nervous troubles may ensue which have been eloquently described by Dr. Crichton Browne. All this may be true enough, and great care should be taken that a punishment whose essence consists in its being short and sharp and transient in its effects should not be so used or abused that it may leave permanent bad traces behind on mind and body. Weakly or sensitive boys should only be subjected to corporal punishment on the gravest emergency, and then it should be applied with all the leniency which the circumstances will permit; and when its infliction is really necessary in any case, it should be conducted with much consideration and ceremony, and the regulation of our larger schools that it should only be inflicted by the head-master in person is a good one. Attention has occasionally been called to serious and even fatal accidents following the unregulated use of

flogging when passion unfortunately overmasters reason ; and meningitis has followed a blow on the head and the membrana tympani been ruptured by a box on the ear. It is no part of our duty to lay down the sort of offences which call for the use of the birch or strap, but we may point out to educational authorities the importance of bearing in mind that stupidity, or peculiarity of manner, or apparent sullenness, or disrespect, may be due to physical causes, to bad air, or insufficient food, or incipient brain disease, or bad sight, and that medical treatment rather than harsh discipline may be required.

Discipline of course demands that there should be some means of checking wilful and repeated infringement of school law, and the necessity for this will arise with greater or less frequency according to the character of the head-master and the awe and respect in which his authority is held. It is no part of our duty to suggest any details for the regulation of punishment ; but we are bound to condemn anything which may do physical harm, such as locking up little boys in dark rooms, reducing the dietary, or compelling the culprit to write out so many hundred lines in a given time. The last of these being a very fashionable mode of correction, we enter our protest against it on two grounds—first, the injurious effects

of such hasty scribbling on the handwriting; and second, the damage done to sight and figure by the cramped position which is almost certainly assumed whilst the imposition is being manufactured in the shortest possible time. We would impress upon masters that, if they feel obliged, for convenience sake, to retain this form of punishment, they should insist upon good and legible handwriting, and that they should not be satisfied with the hurried and scrambling scrawl which boys think good enough for such a purpose. Now all this leads us up naturally to the question of overwork, and the question arises, Is this a bogie or a reality? Is the outcry about overpressure which has lately risen up the mere periodical development of one of those scares which disturb society from time to time, and which quietly die away without having done much good or harm? Is it really true that the rising generation are suffering now, and that their successors will suffer yet more grievously, from the stress of a school system which has now been made compulsory, and from which there is therefore no escape.

But first a word or two about overwork in general. Does this exist upon anything like a large scale, and must it be regarded as inevitable, or is it only an accidental state of matters brought on by

intellectual intemperance or by the concurrent influence of other exciting causes? We have no hesitation in expressing our belief that the second explanation is right, and that good honest use of the brain, when healthy conditions are reasonably maintained and when due sleep and nourishment and exercise are taken, seldom if ever does any one any harm. It is of course a mere platitude to say that excess in anything is bad, for we all know that if we eat or drink or walk too much, or lie too long in bed, we will suffer certain unpleasant penalties, with which experience makes us familiar. If any one were to read or write for fifteen or sixteen hours a day, he would soon find that after a certain time his work would probably be worthless, that his appetite and digestion would become impaired, and that the restorative slumber which he gets with difficulty at night would dog his path during his waking moments and encourage periods of torpid idleness which he cannot shake off. The fact is that the brain, like other organs, requires prolonged periods of rest to repair the ravages of waste; but these periods are specially difficult of attainment in its case, because continuous work implies vascular congestion, and the essence of sleep consists in anæmia. If, therefore, intellectual exertion is too intense and continuous,

an anatomical state is created and prolonged which is directly antagonistic to physiological rest and repair, and a breakdown speedily takes place. No one would argue that such a state of matters as this can lead to anything but disaster, but such cases are rare, because *littérateurs* are now convinced that three or four well-used hours are a sufficient amount of actual writing work per diem, and professional men and those engaged in commerce or trade see plainly the necessity for play as well as for work.

It is a matter of common notoriety that longevity is more usually met with among those who have exercised their brains freely and regularly than under conditions of apparently typical health. The bluff country squire who hunts and shoots and spends his time in the open air probably dies sooner than the judge or the leading barrister or the consulting physician, who are perpetually immersed in a whirl of intellectual excitement; and legal pursuits, which by no means predispose to idleness, give a better chance of long life than the perhaps actually more laborious occupation of the habitual pleasure-seeker. We start, then, with the proposition that hard brainwork *per se* is seldom injurious, and that most of the bad effects with which it is often credited depend on

superadded causes by which it is often but by no means necessarily accompanied.

When pecuniary anxieties step in, when family troubles or professional failure lead to depression and disappointment, then one of the most important factors of ill-health makes its appearance in the shape of worry, and impairs nutrition, starves sleep, and imperils the integrity of the heart and kidneys. When we come to analyse the causes of physical collapse in the height of some successful career, we will usually find something beyond the mere over-work which has been regarded as the breaker which has shipwrecked health. Sir Walter Scott in the midst of his joyous and triumphant life was a model of robust vigour until the financial crisis came which destroyed all his hopes; a prolonged American tour and the mental strain of frequent readings shattered Dickens's highly-sensitive nervous system; whilst family anxieties are believed to have been, in part at least, responsible for Thackeray's premature death. Let us take Anthony Trollope as a comparison, and quote in his own words his account of his work, conducted as it was under thoroughly healthy conditions of invariable success and level merit, suffering no diminution of vigour or of interest up to the moment when the pen was laid aside for ever, but combined,

be it observed, with hunting and the pleasures of congenial society taken at proper intervals and with perfect enjoyment:—

‘The work that I did during the twelve years from 1859 to 1871 was certainly very great. I feel confident that in amount no other writer contributed so much during that time to English literature. Over and above my novels I wrote political articles, critical, social, and sporting articles, for periodicals without number. I did the work of a Surveyor of the General Post Office, and so did it as to give the authorities of the department not the slightest pretext for fault-finding. I hunted always at least twice a week. I was frequent in the whist-room at the Garrick. I lived much in society in London, and was made happy by the presence of many friends at Waltham Cross. In addition to this we always spend six weeks at least out of England. Few men, I think, ever lived a fuller life, and I attribute the power of doing this altogether to the virtue of early hours. It was my practice to be at my table every morning at 5.30 A.M., and it was also my practice to allow myself no mercy. By beginning at that hour I could complete my literary work before I dressed for breakfast.’¹

¹ *An Autobiography.* By Anthony Trollope.

Now the remarks which we have just made apply equally to the case of boys, with this exception, that they are much less liable than adults to be exposed to those other conditions predisposing to lowered vitality which so often complicate and are even mistaken for overwork. A public-school boy may now and then feel a bit worried about his lessons, and perhaps lose an hour or two of sleep in thinking about his mathematics or his Greek, but his elastic nature quickly rebounds, and a good innings at cricket or the rough-and-tumble excitement of football will soon make him forget all his woes. There are no unpaid bills waiting for him at home, no wife or children whose future troubles his thoughts, none of the dreary anxiety of professional failure, when briefs will not appear and patients go elsewhere, or when Church preferment passes by and leaves him shivering in the cold. He is naturally annoyed when he does not get up in form as well as he expects, or when he does not get into the Eleven or the Twenty as soon as he thinks that his merits deserve; but one thing soon puts another out of his head, and the freshness of youth prevails. And it is lucky that it is so, because, what with entrance examinations and superannuations, and University preliminary ordeals and competition and cramming at every turn, the life of

the little boy has become so perilously like that of the struggling man that grave evils must result were not the safeguards against strain so many and effective.

Now I do not speak without book in this matter. During nearly three years I had the honour to hold the responsible post of medical officer to Rugby School, and therefore had good opportunities for studying the effect of work upon the health of the boys. Every case of illness was necessarily brought under my notice, and the result of my observation was that the amount of lessons was by no means excessive, and that this theoretical conclusion was amply confirmed by experience. Cases of headache and malaise were of course met with from time to time, but only in two instances did I observe any really bad effects from what might fairly be called overwork. Both of these were lads about eighteen, high up in the school, clever, energetic, ambitious, and anxious to excel both in and out of doors, and as a result of this they played games so vigorously and read so hard at night as to put on a double strain which soon exhausted their nervous energy. Symptoms resembling brain fever speedily developed, and they were acutely ill for several days; but I am convinced that they would have escaped these risks had

any one in whom they believed taken a quiet opportunity of hinting that they were living unnatural lives, and advising them to pull up before the bottom of the hill was reached.

It would be natural to believe that little boys in preparatory schools would be more liable than their elders to mental strain, because their brains are softer and less mature, and because they are exposed to all the vexatious worry of competitive entrance examinations before they can get into the big school. But I had also the professional charge of several of these establishments, and did not observe any of the evils which have been so frequently described.

The saving clause in all these cases was that the boys were well housed and clothed and fed, that their labour was not excessive, and that they got ample holidays and plenty of play. The responsibilities of their daily life pressed lightly upon them ; but Sir Andrew Clark shows us what happens when mere stress of work is combined with an intense and perhaps morbid anxiety about its result, and unrelieved by fitting periods of relaxation. The examination for the Indian Civil Service is especially severe and prolonged, the result may make or mar a career, and as the outcome of this tension, unrelieved by frequent intervals when the bow is unstrung, the eminent

physician points out that albuminuria frequently follows.

But what about the children of the poor? They have to conduct their work under very different conditions to these. They are not well housed, they are scantily fed, they are insufficiently clothed, their moments of leisure are few and far between, and holidays from the enjoyable point of view they have none. What effect has school work upon them?

We need hardly remind our readers of the controversy which has lately been raging on the subject of over-pressure, and the subject is one of so great and pressing importance that we do not claim any apology for directing attention to it at some length. Ever since education became general and, it is to be hoped, universal under the Revised Code we have had opinions given from time to time regarding its bearings on health. Various discussions have taken place on the subject in the *Times*, in the Social Science Congress, at the Elementary Teachers' Association, and at the Education Institute of Scotland. At the meeting of this important and representative body held at Aberdeen in 1883, I was honoured with the request to read a paper, and although some of the views which I then expressed have been already stated in somewhat greater detail

a few pages back, I venture to reproduce some portion in the somewhat different phraseology which I then adopted :—

‘ Among the immense mass of children attending our Board Schools, there must be many whose badly-nourished brains are vainly struggling against difficulties apparently insurmountable, whose natural distaste for learning is not diminished by their being compelled to acquire things which they dislike and can barely understand, whose evening preparation has to be conducted amid noise and cold and dirt, and who are eagerly looking forward to the time when they can throw it all aside and begin the real battle of life. The enthusiasm with which the Education Act was received, and our natural satisfaction when we reflected that a sound mental training was now brought absolutely within the reach of all, must not blind us to the duty of examining into its possible defects and endeavouring to suggest emendations and remedies. I am here to-day for the purpose of trying to pick holes in its working from the sanitary standpoint, and, whether I be successful or not, I can at least hope to furnish some pegs on which the experienced men whom I see around me will be able to hang their contribution to the discussion which I have undertaken to open.

‘The earliest rudiment of education, no doubt, is received whenever the first ray of light strikes the eye of the newly-born child. From that time onwards the training of the senses makes rapid progress, and the perceptive, and even to some slight degree the reasoning, faculties become gradually developed. Up to a certain point, therefore, the children of the rich and the poor are placed under precisely the same circumstances as regards what nature communicates to them, with this exception, that the street arab is probably much sharper and ’cuter than his contemporary who has been lucky enough, according to the old saying, to be born with a silver spoon in his mouth. But after this their ways diverge rapidly. The time comes, probably somewhat irksome to all, but extremely distasteful to many, when the freshness and freedom of early life are to be exchanged for more formal discipline, and when the vivacity and exuberance of youthful spirits are to be subdued by lessons. The change bears less heavily upon the child of wealthy parents, because his mind is in some measure prepared for further training by what he has heard and seen at home, and even, probably, by some preliminary work, and when he actually goes to a school he finds much enjoyment in the companionship of friends, in the

elaborate arrangements for his comfort, and in the organised variety of the games proper to their various seasons. But the poorer lad, when taken away from the fascinations of idleness and put in intellectual harness, brings to his tasks a mind utterly devoid even of the most elementary training, save the sharpness acquired by early contact with the world ; and the early problems submitted to his attention are only to be mastered with toil and grief and depression of spirit. We do not often see the evil effects of this in the country, where the air is pure and the food, if coarse, is abundant and wholesome ; but every medical man who has seen anything of children's diseases in our large towns will agree with me that grave evils often arise.

‘ We must remember that this is the time of growth and development, when the foundation of the future constitution is being laid, when hereditary tendencies may be eradicated by judicious management, but when the seeds of future disease are frequently implanted by want of due care and attention. The irrational forcing which produces the infant prodigy of to-day is also responsible for the utter collapse or the gradual subsidence into commonplace mediocrity which too often follows, and short of this we see numerous and varying phases of injury

from ill-timed or excessive work. Headache, for which no cause can be assigned but the school lessons, lassitude, depression, dyspepsia, want of sleep, and an unnatural anxiety about the result of examinations, and eager desire to push on with the lessons, which seem to form a morbid species of pleasure, have frequently come under my observation both in boys and girls, and to mention one particular disease, chorea, or St. Vitus's dance, has several times in my experience been ascribed by parents, and I believe justly, to nervous strain and worry in connection with school work, which, although not excessive in itself, happened to make too heavy demands on the feeble brain of the particular patient; and unless the teacher has some little knowledge of physiology, and has more than the usual average share of observation and common sense, serious injustice may be done. The headache may be put down to malingering ingenuity; the inattention and restlessness, arising from bad air, or bad teaching, or simple irritability from nerve exhaustion, will be ascribed to perverse wrong-headedness; and the grimaces and eccentric movements of incipient chorea have before now been chastised as pieces of impudent buffoonery.

‘Then, again, we have the forcing of mind and

memory along special grooves, and in certain rigidly defined lines, without any reference to specific idiosyncrasies or tendencies, the necessary passing of certain standards at specific times, and, above all, the dreaded visit of the Inspector, whose formidable shadow, cast by the reality of coming events, is too often the origin of many sleepless nights. And, without wishing in any way to undervalue the work of men whose labour has been of the most invaluable kind, I would venture to suggest whether it has not occasionally happened that want of tact or a dictatorial and unsympathetic manner may not so frighten the little children, who are just beginning school work, as to drive away every scrap of learning out of their heads, and make them temporarily pose as little better than idiots.

‘ But it may not unreasonably be said : Granted all this, agreed that feeble, ill-nourished brains must be treated with care and caution, and that education had best be conducted with reference to individual qualities and powers, what is your remedy ? You surely would not propose that the State should feed all half-starved children, or not allow them to go to school unless they can produce a certificate of having eaten a good breakfast or dinner ; and it must be quite self-evident that in dealing with large numbers

for educational purposes, some definite scheme must be laid down and some special curriculum followed out in order to obtain really substantial results ; and you surely would not wish to minimise in any way the vast benefits of compulsory education, or interfere with the free and full working of the Education Act, on account of the exceptional drawbacks and dangers which you have just indicated ? Certainly not ; but, considering how much harm may be done by want of knowledge or by faulty or over-rigid arrangements, we ought to see whether we cannot effect improvements without disarranging the general curriculum in any essential degree ; and with reference to that very matter of diet about which I spoke just now, whilst we cannot supply nourishment to all the poor children attending our schools, we may, at all events, teach their parents how best to feed them at smallest cost, and especially lay down the broad principle that no work should ever be done in the morning before some kind of breakfast, be it only a bit of bread and glass of milk. Then, again, would it not be possible to obtain some relaxation in the rigid regulations of the Code by which a little more elasticity might be permitted at the discretion of the teacher, and very small children, barely out of the nursery, conducted much more gradually up the steep

slopes of learning ? Remembering, as we should, the great varieties in human brains and capabilities, would it not be possible to devise some system which would no longer make it necessary for the master to spur on the stupid to keep up with the smarter and more intelligent, or to hamper the progress of clever boys because the dunces must be dragged on to the same level ? When an invincible distaste is shown for any branch of study, and the mind seems barely able to grasp even its rudiments, it might be well to allow more special concentration on something else, even as in our public schools natural science and modern languages are now permitted at choice to take the place of those dreary Latin verses which still fill the recollections of many with depression and regret.

‘ It has seemed to many excellent observers that it would be far better to judge the work of teachers by the general results of the classes, rather than by individual examination in separate standards—a plan which must inevitably fail in many instances to obtain the desired end. Competition is naturally the only way in which appointments can be claimed by the most instructed applicants ; but it is well known that many of the best students make the worst appearances on paper ; and in our Board Schools, when the

Inspector, who may possibly have been used as a convenient bogey, actually arrives, the children in some country districts in the North—totally unaccustomed as they are to see strangers, and possibly barely understanding the Southern tongue of their interrogator—are so paralysed by terror as to be quite unable to give out what they really know, and the teacher, as well as themselves, suffers for their supposed stupidity; and during the whole of the year that intervenes between this painful experience and its inevitable repetition, the prospect of the ordeal is hanging over their heads, sharing their alarms with the vague, shadowy imaginations concerning School Boards, of whose powers and malignant influence they not infrequently contract the most exaggerated ideas. Coming now to matters more nearly connected with hygiene, I suppose no one would attempt to argue against the theoretical advantages of regular school inspection by properly qualified medical men. Difficulties there are, no doubt, in the way from the practical standpoint, and the question of expense would have to be seriously considered; but I cannot think they would prove insurmountable.

‘An excellent machinery already exists in our medical officers of health, to whose duties, already so

efficiently performed, the occasional supervision of our educational arrangements would prove no very intolerable addition, and the extra salary need not be very large. To begin with, the construction of all school buildings would necessarily be superintended by them, and their ventilation and proper heating and lighting would be regulated under their direction. He would be expected to drop in occasionally to see how the work is going on, and to take a general look at the children with a view to detecting the evidences of over-strain or physical deterioration, and find out whether bad air was gradually poisoning the blood or cold and damp rendering it torpid ; and in spare moments he might from time to time instruct the teacher in many things—that the eager minds of the precocious enthusiasts after knowledge should be repressed rather than encouraged, that inattention and languor and irritating fidgeting may mean something more than mere perversity, and that good health may be looked upon as possibly of greater value than knowledge. It should be in his power to enable weakly boys to attend for half-days, or for a short period per diem, without the reduction of the emoluments of the master ; he should see that school hours are not unduly prolonged without a meal of some kind, and that some systematic attempt is made

to get the children to play properly. And then it would clearly be his duty to give certificates to children unable from illness to attend school, and to see that infectious cases are duly isolated and not allowed to mix with their companions until convalescence is thoroughly established, and all danger of contagion gone by ; and in this way the accusation often and justly made against day schools as perhaps the leading means of propagating communicable disorders might be at all events partially removed.

‘To come now to a conclusion, it must be quite evident that, although an ideal system of education must have regard to individual idiosyncrasies and tendencies, to hereditary predisposition, and to sanitary and hygienic arrangements in every possible direction, the great mass of the people must be trained, according to general plans arranged and matured, to ensure the greatest efficiency of the greatest number. The best results will of course be obtained by those whose skill and experience enable them to bring their instructions down to the level of the young and unformed minds with which they have to deal, remembering the terrible strain thrown by the entirely new condition of training on the nervous energies of infants suddenly reclaimed from the town alley or the country lane, and forcibly thrust into

educational leading-strings. That the future success of our country amid the ever-growing competition of foreign rivals must mainly depend upon the efficiency and universality of its education is a truism of the most elementary nature, and we must rejoice to see the progress which is being made, and the prospect at no distant date of providing more thorough facilities for secondary and technical instruction.

‘It would be most unfortunate if the lustre of these splendid results were to be in any way dimmed by preventible drawbacks, interfering with health and proving a source of weakness rather than of strength to our juvenile population; and although the evils which I have ventured to point out may be neither very serious nor widespread, they are certainly worthy of consideration with a view to their ultimate removal. And I hope that the remarks of those who will now follow this brief paper will greatly amplify even if they do not entirely confirm my views, and will furnish some more practical hints than I have been able to suggest for the alteration in such details of our present school system as may fairly be considered as prejudicial to the general health of children.’

The acute stage of the question of over-pressure was reached, however, about the end of 1883.

Mr. Mundella was asked in the House of Com-

mons whether his attention had been called to a letter written by Dr. Crichton Browne to a Bradford paper, complaining among other things of the 'grinding tyranny of education with which we are threatened,' and going on to say that 'it seems to me that it is high time for a declaration of rights on behalf of helpless children and on behalf of future generations also, whom, if we are not careful, we shall load with a burden more grievous than the National Debt, a burden of degeneration and disease.' Mr. Mundella, duly impressed with such a serious indictment coming from such an authoritative source, and anxious as he always is to administer his great department with justice and with care, asked Dr. Browne to 'inspect a few elementary schools, and report his impressions as to the effect of their work on the health of the children attending them;' and the result of visits to twelve Board and two denominational establishments was accordingly embodied in the form of a letter dated April 30, 1884.

I strongly recommend a careful perusal of this document to all my readers, for the style is forcible, flowing, and picturesque in the highest degree, the physiology is sound, and the views expressed are those of a cultivated and acute intellect. The conclusions arrived at, however, are alarming in the

highest degree, and although space will not admit of our giving a very complete *résumé* of what the author has so well expressed, we will furnish a bare abstract which can readily be filled up from the original document by interested inquirers.

The first specific allegation is the great frequency of habitual headache, principally frontal in character, occurring usually towards evening, and depending for the most part on fatigue 'attributable to changes in the ganglion cells of the grey matter of the brain, and to vascular changes dependent thereon.' These changes are probably due to blood-vessels kept too continuously on the stretch losing tone and contractile power, leading to congestion, impaired nutrition, and the various pathological evils which follow in their train; and as sleeplessness and broken sleep seem to be common among school children, the great nervous centres have in such cases been deprived of the amount of rest necessary to balance waste by repair.

St. Vitus's dance, both in its major and minor forms, was shown to be on the increase, stammering and stuttering are more common than they ought to be, neuralgia and dental caries were not infrequently observed, and short sight 'threatens to become a national infirmity in England, as it is in Germany.'

That insanity is on the rise among us is now admitted by the best observers, and Dr. Browne explains this uncomfortable fact by the existence of over-pressure, ascribing also the augmented total of deaths from nervous disorders of later years among children, and from diabetes in young adults, to the same predisposing cause. He points out with much force the evils of keeping in children who cannot get through their proper proportion of work in actual school hours, he denounces home lessons and payment by results, and shows how much terror and anxiety is often produced by the near approach of an examination. His chapter on pupil teachers is not the least suggestive and instructive part of his paper, nor can we afford to disregard the warnings which he so eloquently gives of the evils resulting from the deficient hygienic arrangements for mind and body under which they are too frequently compelled to live. Such a meagre abridgment as this can of course only do scant justice to a Report the ability of which is undoubted; nor can we do more than refer very briefly to the comments by Mr. Fitch which follow, and which unquestionably succeed in finding some weak points in the Doctor's armour. Her Majesty's Chief Inspector of Schools shows, I think, that some of Dr. Browne's methods of investi-

gation were, to say the least, open to exception, and that the inquiry was conducted too rapidly and superficially and on too narrow a basis to be really authoritative. Even granting all this, it seems to me that Dr. Browne's labours have obtained somewhat scant official recognition, that there has been a tendency to pooh-pooh all that he had said, and to paint everything connected with the Education Department in the brightest of rosy hues. In saying this I should be sorry to detract by one jot or tittle of a hair's breadth from the credit which is so justly due to those who carried through the great work of bringing a sound and sufficient education within the reach of all, and I gladly bear my testimony to the great ability, energy, and enthusiasm which Mr. Mundella brings to the discharge of duties which are so evidently to him a labour of love. With much of Mr. Fitch's clear and well-reasoned Memorandum I cordially concur; but I think that sufficient deference has not been paid to Dr. Browne's opinions, considering the high rank in the profession which he admittedly holds, and the value to be attached to his views on any points trenching on his own speciality. Allowing that there may be exaggeration in some of his conclusions, the public owe him a debt of gratitude for drawing attention so forcibly to the

subject of over-pressure, and bringing to a direct focus ideas and arguments and statements which had previously been floating about in scattered form. If the ultimate result of this controversy were to be nothing more than to remove the suspicion that physical evil and degeneration may proceed from the present method of working the Education Code, good will have been done, and apprehension of evil, now so widespread, will be allayed.

That some damage does result, however, is admitted on all hands, as the following extract from the last Report of the Registrar-General will show :—

‘ These statistics doubtlessly tend to support the view that the strain of education produces in a certain proportion of children injurious effects upon the brain and nervous system ; and, indeed, that such should be the case might be anticipated, for a certain amount of risk must almost necessarily be attached to the increased use of an organ, and such risk must be accepted as the inevitable drawback from counterbalancing advantages.’

This puts the case even more strongly, however, than I should be inclined to think absolutely correct, for I have already expressed my belief, founded on observation, that among the well-fed, well-housed, and well-clothed children of those in easy circum-

stances the evils of over-pressure are practically unknown. And from what I have seen in Scotland both as a member of a School Board and a resident in a rural parish, I entirely agree with what Dr. Browne says about the extreme rarity of damage from excessive use of the mental powers in this country. What, then, is the specific point of difference? The children in the Highlands are drawn from much the same class as those in whom Dr. Browne traces such deplorable results, their parents are not blessed with much superfluous cash, their routine of study is exactly the same, and, superadded to other drawbacks, they have frequently to 'creep like snail unwillingly to school' for miles in all weather and over rough ground; and yet they do not suffer in any appreciable degree. Why is this? The reason must be looked for principally, if not entirely, in the way in which these various claimants for the blessing of education are fed. The little Scotch 'laddie' or 'lassie' before he sets out on his morning tramp has his good basin of porridge and milk, and takes his 'piece' with him to eat in the middle of the day. The evening meal is probably merely a repetition of breakfast, but nothing more nourishing could well be devised, and rosy cheeks and bright eyes and a generally vigorous look show that the wants of nature are being

sufficiently supplied. How different from the state of things in London ! Let us quote Dr. Browne :—

‘A larger question than dulness, however, in connection with educational over-pressure in elementary schools—perhaps the largest and most important of all—is that of starvation. There are in elementary schools in the poorer districts of London a large number of half-starved children. In one of the Board Schools in Clerkenwell, Mr. Marchant Williams found on the day of his annual inspection that 36 per cent. of the parents of the children were out of employment, that 40 per cent. of the children came to school sometimes without a breakfast, and 28 per cent. came sometimes to afternoon school without any dinner. My school visits were made at a time of the year and in weather when work was not at its scarcest, so that I have come upon nothing as bad as this ; but in all the schools inspected cases of pinching have been pointed out to me, while in some the ravages of starvation have been patent enough. In one school, and that by no means the worst as regards the condition of the children, in which 475 were examined, 129 of these were pointed out to me as being half-starved, and their faces gave doleful confirmation of the fact, while 15 declared that they had had no food that morning. Those

who announced that they were breakfastless were all boys; and I was told, and satisfied myself, that it was useless to put questions on that subject to the girls, who are too sensitive to acknowledge *res angustæ domi* before their companions. The boys blurted out their privations at once, but when a standard of girls, in which the teacher had reason to know that several were without breakfast, was asked whether any had come to school without that meal, there was no response. It was only by the flushing of a pale face here and there that the truth could be surmised. Some inkling also of the prevalence of hunger might be got from the fact that in this school, and two others, in which the master, through the charity of kind neighbours, had dinner tickets to give away, the number of children who were candidates for these tickets was more than double the number that he had to bestow.

‘In one school visited, the head-mistress assured me that to her certain knowledge as many as 8 per cent. of the girls came to school without breakfast, in the depth of winter; in another school I conversed with 6 boys in a standard of 66, with 14 boys in a standard of 80, and with 6 in a standard of 56, who had had no breakfast that morning, and there was a dreadful monotony in the way in which, in reply to

my queries as to the cause of their abstinence, the changes were rung on these answers: "Father out of work;" "Father in the hospital;" "No bread in the house;" "Mother lays abed." The last of these answers I came to understand was often a childish euphemism for drunkenness, or for the morning stupor that follows a night's debauch. In still another school in which starvation abounded, I learned that it was no uncommon thing for a poverty-stricken mother, perhaps a charwoman or a flower-seller, who had had to send her child to school without food, because there was neither food, money, nor money's worth in the house, to arrive at the school-house, in the forenoon, after she had been out and had earned a few pence, and ask to be allowed to hand in a piece of bread to her starving child.

Many children in London who are never actually without food are still partially starved, for what they get to eat is innutritious, or insufficient in amount. The loaf is sometimes the utmost that the family resources can compass, and where there are a number of mouths there is but a small bit for each. Bread and weak tea form the sole sustenance of many children for prolonged periods. Other children are left wholly unprovided by their parents, and have to forage as best they can for themselves. I found

one lad immersed in geography who had had no breakfast, and whose dinner had consisted of two rotten oranges thrown away from a huckster's stall. And there is much partial or occasional starvation amongst children not of the lowest class. The children of poor clerks who come neatly dressed to school have often a lean and hungry look that speaks volumes; and those of artisans not rarely by a sudden failure of intellect and languor of manner intimate to the discerning teacher, without any words, that their fathers are out of work or prostrated by illness.'

Here, then, is the difference—one set of children are well fed whilst the others are not, and bloodless and feeble brains are being strained and stretched to do work which the nervous energy at their command is quite incapable of doing. And we have therefore reached this point, that the educational routine laid down by the Code is not too much for healthy children to do, but that certain conditions, and notably those of under-feeding, are occasionally present which cause symptoms attributable to over-work and over-pressure. What, then, is the remedy? Because a little boy is starved, must we superadd another and more serious drawback to his future career by checking the nourishment of his mind as well as of his body?

Nothing is a more undoubted fact than the way

in which school life improves the moral as well as the mental condition of a child.

It exchanges for a certain number of hours in the day its own dingy and desolate surroundings for a bright, cheerful, and presumably well-ventilated room. It learns habits of self-respect, is eager to wash its face and hands, to piece its poor rags together into something like decency, to improve its demeanour and its manners into some kind of imitation of its teacher's, whom it frequently learns to love and to venerate. New sources of pleasure and of interest are opened up day by day, it sees avenues leading to social advancement and social prosperity, and ambition steps in to cheer on its course and to encourage industry and perseverance. Are we to stop all this because the poor little arab has had no breakfast ; or are we to introduce a pauperising element and lessen the sense of parental responsibility by providing it with a gratuitous meal?

Now no one would seriously suggest that food should be doled out as a matter of routine to every ill-fed child who goes to school, or that work should not be allowed to be done by any boy or girl who cannot prove that he or she has partaken of some kind of breakfast before leaving home. And, again, there are very serious difficulties in the way of classifying children attending our Board Schools according

to their physical powers and mental capacity, and giving them the exact amount and kind of work which seems to suit them best. It is hard to see what more can be done than to lay down a certain educational scheme adapted for average children, and allow teachers a certain latitude of exemption under special and well-defined conditions.

Mr. Fitch tells us that the standard of proficiency in schools has not been raised during the last twenty years, that there is no rigid classification by age, and that in the Code of 1882 special provisions were introduced securing that cases of sickness and unavoidable absence should not affect the grant to a school, and allowing managers to withhold from examination altogether, without forfeiture of the grant, scholars who were weak or mentally deficient. The provisions on this subject will be found in Article 109 e, 6:—‘The following amongst others will be considered reasonable excuses for either withholding a scholar, or not presenting him in a higher standard—delicate health or prolonged illness; obvious dulness or defective intellect; temporary deprivation, by accident or otherwise, of the use of eye or hand. If a scholar has failed in two subjects, or twice in the same subject, he may generally be presented again in the same standard.’ And Mr.

Fitch goes on to tell us that since May 1883, when the Code of 1882 came into practical operation, except in truancy and unexplained absence the exceptions desired by the managers and teachers had been almost always freely sanctioned, 'and that not one in five of the requests made on the ground that the scholars were sickly, or mentally deficient, or otherwise likely to be injured by the examination had been disallowed.'

What is the present state of affairs about home lessons? That they should be injurious to little children living under crowded or insanitary conditions, and whose brains have been kept fully on the strain during the day, is entirely beyond argument, and it is very satisfactory to know that these evils are now fully recognised. 'Home lessons are,' says Mr. Fitch, 'on the whole very popular with parents, but in cases in which the parents object, or in which the scholars come from very poor homes, or are employed in any morning or evening labour, such lessons are not enforced. As to their length and character, I am in the habit of making particular inquiries. I rarely or never meet with a home task which requires more than half an hour to prepare or demands any other mental effort than the fixing and recapitulation of some lesson already taught. I may

be permitted to cite here an extract from a letter addressed by Sir Francis Sandford to an association of teachers some months ago, and since incorporated in the official instructions to inspectors :—

“For delicate or very young children such lessons are plainly unsuitable, and the special circumstances of some schools render it inexpedient to require home tasks in any form ; of such circumstances the local managers are the best judges. But in the upper classes of good schools, in which the teachers exert a right influence, and take an interest in their work, the practice of giving short exercises to be prepared at home is attended with no difficulty, and is open to no practical objection. The best teachers use such exercises rather to illustrate and to fix in the memory lessons which have already been explained in school, than to break new ground or to call for new mental effort. This purpose is served by lessons of a very simple and definite character—a sum, a verse of poetry, a list of names or dates, a letter, an outline map, a short parsing exercise—which may readily be prepared in half an hour, and which admits of very easy testing and correction on the following day. When these conditions are fulfilled the home task is found to have a very valuable effect, not only in helping the progress of the scholar,

and in encouraging the habit of application, but also in awakening on the part of the parents an interest in school work.”’

Dr. Browne in his Report has expressed a very strongly unfavourable opinion on payment by results, and the National Association of Elementary Teachers and many other educational authorities endorse his views. The system is certainly open to the objection that it drives on school children like a flock of sheep, and that harm is often done by squeezing minds of very different force and calibre for examination purposes into precisely the same grooves. It would be desirable to introduce more elasticity, but it is difficult to see how that can be done, and it is quite obvious that when the State contributes large sums in any particular direction, it naturally insists on some definite proof that the money has been wisely expended. And Mr. Fitch is again reassuring in his remarks, for he points out that the Parliamentary grant is paid to managers, not to teachers, and that it is made to depend not only on individual examination, but also on the general efficiency of the school, its discipline, its brightness, the mental activity which prevails in it, the amount of quality of its work, and the spirit in which that work is done.’

The discussion of this subject would be very

imperfect if reference were not made to the opinion of Sir Lyon Playfair, who now occupies a unique position of authority and respect in the House of Commons on this and allied topics. The following extract is taken from the *Scotsman's* report of an address given in Edinburgh by the learned member to his constituents on November 20, 1884:—

‘If I have not entirely exhausted your patience, there is one subject, which is already before Parliament, and must be seriously considered during the next session, that I think I ought to bring before you. It is the alleged over-pressure of children in schools. This subject may appear below our academic level and unnecessary to be discussed by your representative. But that is not so, for our Universities depend wholly upon the people; and if their education in the primary or secondary schools be over-strained, the most damaging effects may be produced as to their intellectual development in future life.

‘The allegation is that the standards in the primary schools are above the capacities of children of this age, so that their health and mental powers break down in their over-strain to reach them. Many medical men show this fear, and some of them have the highest capacity for forming a correct judgment. Among these I need only mention my constituent

and esteemed friend Dr. Crichton Browne, who is one of the highest authorities on the subject of mental diseases, and whose opinions deserve to be treated with respect. I at once accept his evidence that there are, in poorer schools in England, children who are physically and mentally unable to grapple with the standards to which they are put. He confines his observations to England, and says that there are no signs of over-pressure in Scotland. Certainly it is remarkable that the complaints do not come from Scotland, where the pressure ought to be higher, if we judge from the greater number of passes both among children and pupil teachers. Neither do complaints come from Ireland, where they profess to have the same standards and pass a high percentage. But I do not doubt that cases exist in both these countries as well as in England where miserable, sickly, half-fed, and half-clothed children are unequal to tasks which may be suited to the average children in a school. I think that the discussion of the question has been most useful by drawing attention to such cases, which the Education Code now allows to be withdrawn from examination. Still it is possible that there has been a tendency to deduce extensive generalisations from exceptional cases.

‘The standards of the Code vary according to the

age of children, and are considerably lower in their demands than the standards of any other country in Europe. They are far lower than those laid down by John Knox in his time, and yet our Scottish brains have still some substance left. The true principle is to lay down standards suitable to the large bulk of children of a certain age, and to make exceptions for stunted, sickly, and ill-fed children who are unable to reach them. I have tried to examine the subject on this principle, and to ascertain whether the standards are above the capacities of the great bulk of the young population at school.

‘The health of children is a very sensitive barometer, for it rises or falls in immediate response to the condition of their environment. If we find a general increase in mortality among children since education became national and compulsory, depend upon it there is something essentially wrong in our educational systems. If, on the contrary, we find the health barometer rising, we may be satisfied that education is not deteriorating the masses, though it may still have unfavourable effects on individuals. But there are two factors in the question. Since 1870, the date of the English Education Act, there has been a great increase in school life; but there has also been a considerable improvement in public health,

and due consideration must be given to each factor. This is easy to do, because bad sanitary surroundings tell most upon the life of children under five years of age, who are not at school; so that improvement in public health will show its largest result among these infants. As a fact, the mortality among children under five years of age has decreased since 1870 by 10 per cent., and this decrease must be credited to hygiene, including the improved habits of the people. If we now take the Registrar-General's returns of mortality for the decade ending in 1870, and compare that with the five years 1876-80, when the Education Act had got into play, the decreased mortality among school children between five and fifteen is $23\frac{1}{4}$ per cent.

‘In the ten years preceding the Education Act, 1870, there was much activity in voluntary schools. A more striking comparison, therefore, comes out if we take the average of a longer period, when education was less prevalent—viz., 1838-54. This has been carefully done in the *Statistical Journal* for June 1883, to which I would refer you for details. The general results are these: that in the case of children of school age between five and ten, boys have a lessened mortality of 30 per cent., and girls of 33 per cent.; while between the ages of ten to fifteen boys have a

lessened mortality of 32 per cent., and girls of 35 per cent. If you deduct from these the 10 per cent. which gives the maximum due to general hygienic improvement, you have to account for at least 22 per cent. lessened mortality among children of school ages.

‘What has come into existence in the life of the nation to produce such a remarkable reduction in juvenile mortality? I know of nothing except the introduction of a universal school system. You have gathered the children of the poor from the streets and alleys of our large towns, and from their overcrowded and insanitary homes, and you have placed them in well-heated, large, and well-ventilated schoolrooms. You have enforced upon them cleanliness and habits of order, and the result has been, although you only intended to give them education, you have also given to them greatly increased health. To my mind these results are conclusive that, to the great mass of school children, our educational system has not only no deteriorating influence, but a powerfully ameliorating one.

‘Still this does not remove from us the need of dealing with the exceptional cases in which evils have been shown to exist. Almost all the cases which have been made public—and we must remember that

they are only a few instances among the $4\frac{1}{2}$ millions at school—are breakdowns of children in the lower standards. As they get higher, the improving influences of the schools begin to tell. If I read aright the valuable medical warnings which we have received, they lead to these conclusions. A moderate amount of exercise of the body and of the brain is undoubtedly good for children as a whole. Thus a walk of one mile may not be too much exercise for ordinary children, but a walk of 100 yards may for rickety or under-fed children. So exercises in Standards I. and II. may be excellent for ordinary children, but they may be too much for under-fed weaklings. How is this to be met? It has been met in some cases admirably. In the City of London there is a Jewish school of 3,400 children. They are of all nationalities, and are derived from the very poorest of our population. Yet the passes in the standards are very high, although a foreign language—viz., Hebrew—is added to their education. No complaints of over-pressure come from this school. The reason is that charity comes to the relief of the ill-clothed and half-fed children. Clothes are provided for the indigent, and a supplementary meal of bread and milk is given to all those who seem under-fed. The result has been to make all the children

happy and eager for this school work. I am glad to say that this example is being now extensively followed, as an act of charity, among schools of the poorest kind, and with admirable results. You cannot do this at the cost of taxation, or of the rates, because that would be a large step towards Socialism; but charity can undertake to meet the exceptional cases in our schools. My excellent University colleague, Mr. Campbell, who is always zealous in the promotion of education, described to us in Parliament a school in Scotland in which he was interested, and showed how, by giving food to under-fed children, the school passes became greatly augmented. The general result to which I have arrived, by a careful consideration of this question, is that we must be guided by medical experience in bringing charitable influences to bear upon the condition of ill-fed and ill-clothed children, so that the ordinary mental exercises, which are not too much for the great mass of our young population, may not bear too heavily on the feeble frames of the sickly and nervous weaklings.'

Summing up all the evidence, then, are we in a position to give any kind of judicial opinion on the subject of over-pressure? Does it exist on any dangerous scale, or is it merely one of the many

lamentable results of starvation which are only too numerous among us? The comparison between England and Scotland made by Dr. Crichton Browne seems almost proof positive that a difference in feeding is the real cause of the striking physical contrast between the two sets of children, and that if we could nourish both equally well we should get the same results. There can be little doubt that much discomfort and even danger are caused by the present system of education, whether it be due to over-pressure or under-feeding, and that in confirmation of this view we cannot ignore the confidently expressed opinions of teachers and of medical men.' Further information is required and will speedily be forthcoming, for the London School Board are prosecuting an inquiry, and it is to be hoped that Government may yield to a very widely expressed wish, and appoint a Royal Commission to investigate a subject the importance of which can hardly be exaggerated.

IV.

SCHOOL PLAY.

IN preceding chapters we have shown that healthy life requires to be sustained by wholesome food, well cooked, and consumed with regularity and without excess. But unless the elements proper for nutrition are properly digested, chronic starvation may go on in the midst of plenty, languor and lassitude will take the place of vigorous energy, and the blood which bathes every organ and tissue, and brings them in contact with the supply of material from which their rapidly-wasting structure must be built up, grows thin and pale. Nerve force essentially depends on a condition of the circulating fluid in which the red corpuscles are present in sufficient number to carry out the important duties assigned to them of carrying oxygen; and when they fall below the proper standard, either in quantity or quality, the brain and other great centres lose some portion of their regulating power, mental work becomes irksome, and if it must

be done, it is badly done, and leaves fatigue and lassitude behind. Depression and disturbed sleep, and dyspepsia and neuralgia, and a general disinclination for exertion, both of body and mind, become so chronic as to be looked upon as inevitable evils, part and parcel of the individual constitution and not to be removed by ordinary means. And in many cases, no doubt, the habit, so to speak, of only living half our lives has been so indelibly stamped upon us that it is too late to make any real reform. Some portion of this in the case of sedentary workers in our large towns is no doubt unavoidable. A clerk in the City has to spend long hours at his desk, he probably lives a long way from his work and must use the omnibus or the Underground, and when evening brings his release he is probably too tired to summon up enough energy to take any active exercise, and so he simply once more mounts his bus or enters his railway-carriage, and hurries away to enjoy his rest at home. His pleasures are few, and he is severely oppressed by the drudgery of the life he is compelled to lead, and the dreary monotony of the prospect before him, without apparent hope of break or change. But one bright spot remains; the annual holiday must come at last, and make him a free man for a fortnight or three weeks. Perhaps he goes abroad, and takes a

walking tour among the Alps. He does a little mountaineering and enjoys the invigorating tonic of glacier air, but the stimulating influences around tempt him to attempt too much. He grows fagged and weary, he sleeps badly, 'he goes off his feed,' to use a slang phrase, and returns to work in worse condition than when he left, bitterly disappointed to find that the long-anticipated treat has not done him more good. Cases like this are by no means infrequent, and will continue to occur as long as those who take no exercise at home imagine that mere change of air and scene will enable them to attempt active exertion which demands careful preliminary training and the cautious use of physical powers which have been artificially stimulated by excitement and an exhilarating atmosphere.

Probably the case of our friend's principal, who pays him his weekly dole, and enjoys the spending facilities of an ample income, has some points of similarity to his own. The rich man, like the poor, may have his season ticket by rail, or may substitute for the 'knife-board' the luxurious cushions of a brougham hung between C-springs and a pair of high steppers. Contact is rarely permitted between the mud of the pavement and the soles of his well-varnished boots, but a safe cob perhaps takes him

leisurely through the park to his house at the West End, where his *chef* has used his best endeavours to tickle the palate of his fastidious master. If appetite be wanting, there is no lack of variety to tempt the tired man of business to eat more than the wants of the system require, appropriate wines accompany the various courses, and the evening closes in cheerful society or in the smoking-room in company with good cigars; and so the routine goes on until dyspepsia raises its warning voice, and gout in some of its varied forms, or biliary derangement, or various functional disorders of undefined character, compel a visit to the doctor, who prescribes a strict regimen under which a temporary truce is effected, and matters are patched up for the time. The clerk and his master have, at least, this in common, that neither of them are taking enough exercise, that they are not digesting their food properly, and that their muscular development is only sufficient to enable them to run along the most ordinary grooves of life. If either of them were to take a short turn on a horizontal bar, or to try five minutes' dumb-bell drill, we can imagine the stiffness and discomfort which would be the inevitable consequence; a few yards' brisk run would bring on an agony of breathlessness, a chance slip or fall may rupture some slack

tendon or loose fibre, or sprain the ankle so badly as to lay him up for weeks or even months. Hardly a year passes that we are not shocked by the sudden death of some middle-aged or elderly man after a hasty rush to catch a train, and the unsatisfactory conclusion is therefore forced upon our minds that many of us are bodily unfit for any unforeseen but perhaps necessary exertion, and may seriously and even permanently suffer from the results.

I am quite aware that if this had been written twenty years ago it would have had a much wider basis of truth than it has at the present time. The upper classes then, as now, played their games at school and shot and hunted in after life perhaps even more freely than to-day, but little or nothing was provided to enable others who could not afford these expensive luxuries to keep up their physical development. The Volunteer movement was then in its infancy, gymnasia were few and far between, cricket and football clubs in our great shops and warehouses were then comparatively rare, swimming and boating were still looked upon in some measure as specially belonging to the rich. Bicycles and tricycles, which now provide first-class muscular exercise for thousands, had not yet been invented, and the holiday must be spent in a dull listless walk

with the inevitable public-house at the end, or in loafing pure and simple with or without the accompaniment of beer. I freely recognise and most cordially appreciate the great improvements that have been made in these respects in later years, but much still remains to be done, and I would put in a plea for a much more extended and systematic training in athletics than has yet been recognised as an essential part of the education of the people.

The physiological argument in favour of this is quite complete. The merest tyro in science knows that the healthy functioning of any particular organ or tissue can only be attained by moderate use. Without this, nervous influence is withheld, a sufficient supply of blood is not furnished, and whilst waste still goes on, its products are sluggishly and imperfectly removed, and what is newly laid down to take their place is feeble and ill developed and prone to degenerative change.

If we examine the muscles of the arm or leg of a patient suffering from paralysis of some little duration, we will find them pale, flabby, easily torn, and responding feebly, if at all, to the electric stimulus. Examination into their minute structure shows that fatty degeneration has set in, and, even were they to resume their power of movement by the sudden

recovery of the sufferer, it would be some time before they could take up their old duties with anything like efficiency. Now this process on a minute scale is taking place in the comparatively unused limbs of the great mass of sedentary workers. It would probably be too much to say that any individual muscle in the body is not used more or less during the twenty-four hours. A certain elaborate and harmonious arrangement keeps the body in the erect posture; we cannot sit, or lie down, or stand up, or breathe, or lift hand or foot, without bringing into play definite combinations of co-ordinate muscular structures, which work together with an admirably adjusted mechanism to fulfil the end in view. All this must go on, although we never devote five minutes of the day to active exercise, and as an additional stimulus to vitality the integrity of the spinal cord keeps the muscular system in a perpetual state of tonic contraction. If we feel the limbs of a sleeper whose bodily frame is relaxed to the extremest degree short of death, or, still better, try the same simple experiment during the most profound narcosis of chloroform, we will find them to be tense and firm, and to afford a species of passive resistance to the finger. If the spinal cord were now suddenly cut across, a flabby softness would at once replace the elastic rigidity previously noted,

and degenerative change from that moment would begin slowly but surely to set in. Nature, therefore, provides means by which the mechanism necessary for the proper performance of bodily function shall be kept in sufficient working order to withstand ordinary wear and tear, but to reach the highest level of health a good deal more is required. The contraction of a muscle depends on the pulling together of the ultimate fibrillæ of which it is composed; the little dark masses seen on microscopic examination, and which constitute in all probability the contractile elements, coming more closely together, and the fibres themselves thickening and shortening. In order that this process shall be thoroughly carried out, proper nervous stimulus and a due supply of healthy blood are required, so that the carbon elements shall be duly burnt, and the products of their combustion rapidly removed. The use of a muscle up to a certain point undoubtedly increases its growth, and the classical illustrations of the hypertrophied leg of the ballet-dancer and the powerful biceps of the blacksmith must be familiar to all. But if waste is allowed to exceed repair by the exhaustion of nervous energy from too hard and continuous work, then an opposite state of things occurs, as is well seen in the case of the file-cutters

of Sheffield. It seems that there are specialities in their trade which call for very frequent and rapid contraction of the muscles of the forearm and hand, and that an enormous increase in size is the first result. As years go on, however, wasting gradually sets in, and eventually becomes so extreme and renders the limbs so helpless that wages have to be calculated on this basis, and made exceptionally heavy, in order to enable them to acquire a competence during their few active years. The case of the blacksmith is much the same. As long as he is young and strong and well fed, he presents the special configuration so dear to the physiological eye; but when age begins to set in, or if his health fails, or if bad times or an increasing family restrict his diet, his arm too will begin to dwindle away from its pride of strength. The ballet-girl also comes forward in support of the argument, for whilst the calf of the principal performer attains a remarkable size, we will observe a very different condition of things among the ordinary rank and file, who have to work hard on insufficient pay, and whose limbs are usually below even the ordinary average of development.

The proposition may therefore be looked upon as proved, that our muscles require some active exercise beyond that which is absolutely necessary for physio-

logical purposes, and I now advance one step further by saying that it is all-important that they should be braced up by a properly systematic athletic training in early life. I have previously expressed my conviction, which will hardly be disputed, that the scheme and plan of our tissues is laid down during the period of growth and development, and that from this model we do not depart very essentially in after years. If we start a lad into the world with loose and flabby muscles, loose and flabby he will probably remain till the end of the chapter, and greatly marred his career probably will be for want of a physical development sufficiently strong to withstand the jolts and jars of life. And if this is the case with respect to the more ordinary structures of the body, most especially does it hold good with reference to the heart, whose muscular walls behave in many respects like those whose integrity is of less vital importance. But in some respects its case is peculiar. In the first place it is absolutely unresting, and under all circumstances of weakness or of disease it must go through its daily routine of work with punctual and unvarying regularity—work which is infinitely more laborious in proportion to its strength than that of any other organ in the body. Professor Haughton tells us, in his ‘Principles of Animal

Mechanics,' that the left ventricle contracts with a force equivalent to that required for lifting 3 ozs. through a height of nearly ten feet, the daily total amounting to 89 tons. Or, on looking at the question from another point of view, the capacity of the ventricle being 3 ozs., and the absolute mass of blood at any one time in the body being estimated at from 9 to 10 lbs., the entire quantity (assuming the pulse to be seventy-five) passes through the heart at the end of fifty-three strokes, corresponding to forty-two seconds. The extraordinary amount of labour which these calculations bring so graphically before us, being compensated for by no lengthened periods of repose even during sleep, we see the vital importance of industry on the part of the organ which really holds our life or our death within its little cavities. Then we have to consider the peculiarities of its nerve supply. It is now admitted that the nervous ganglia scattered so freely in its substance belong to the sympathetic system, and that their unbridled action spurs on the action of the heart to excessively rapid contraction. The plan would seem rather a cumbrous one, and hardly in keeping with the usual simplicity and efficiency of nature's works, that one set of nerves should be specially designed to set a drag on the working of another; but our physiologists tell us that fibres of

the vagus are distributed to the heart for the purpose of inhibiting or restraining the action of the sympathetic. We all know that when we run fast in an unprepared state, or go rapidly up hill, how quick and weak our pulse becomes ; this depending, in the words of Dr. Handfield Jones, 'on exhaustion of the vagi, so that the state of nerve force, as well as of the actual muscular tone, must be carefully inquired into' in estimating cardiac vigour. The heart, therefore, will share in the good effects produced by exercise on the rest of the body ; 'its muscular tone' no less than its nerve force will be improved, it will be accustomed by habit and use to sudden calls upon its energy, and it will be able to meet these drafts without inconvenience. And in after life its possessor will be able to run a few yards without breathlessness or impending syncope, and the probabilities of premature death from failure of its power will be considerably diminished.

It is, then, an undisputed fact that regular exercise improves the quality of the muscular structures by necessitating that brisk contraction on which the efficient repair of the ravages of waste essentially depends. But it does a great deal more than this. It expands the lungs, sending fresh air deep down into the residual cells, it charges the red corpuscles

with oxygen, and aids the escape of carbonic acid. It improves the appetite, enables more food to be taken with relish, and it facilitates digestion by aiding the movements of the stomach, encouraging the secretion of gastric juice, and promoting the peristaltic movements of the intestines. It whips up the liver into brisker action, it lightens the labour of the kidneys by stimulating the skin functions, and every organ in the body in turn shares the benefits which it confers. More food better digested means, of course, a better quality of blood ; better blood means a healthier and more vigorous nervous system, more efficient brain-work is done, and an efficient control kept up over the way in which every gland and organ and tissue does its work. This may be a Utopian sketch, but such an ideal is well worth striving after, and is attainable within certain limits by all who regulate their lives according to the inflexible laws of nature, and whose circumstances do not place unnatural impediments in their way.

All that has been said up to this point may perhaps be looked upon as merely introductory to the ostensible object of this chapter, but in reality it covers a good deal of the ground. If we can make out a satisfactory plea for early and systematic athletic training, then little more argument is needed

in support of games at our public schools, and we might now proceed to wind up with a few remarks on the special arrangements which ought to be made for carrying them out successfully. But we are interrupted by Paterfamilias, who wishes to let off a little grumble on modern education, and to tell us that, although his sons are capital cricketers and enthusiastically fond of football, he never hears them say a word about Homer or Horace, nor does he ever find them with a book in their hands when they can possibly find anything else to do. After long years of work at school, the expense of which has cost him many a good groan, he finds them quite unable to pass the most ordinary competitive examination without special grinding and the running up of more heavy bills, and if he sends them to the University, they will simply lead three or four more years of the same life, gaining possibly fresh laurels on the river or the cricket-field, but coming home when all is over with a very ordinary degree if they can get one at all, and having made a few friends and spent a good deal of money. Now this picture is unsatisfactory enough, but it is somewhat old-fashioned in style. No system of training can of course work up a stupid lump of human flesh into anything like an apostle of culture, and all the

sweetness and light in the world would be thrown away upon a certain class of the young men who assume the gown of the undergraduate. Nor can the lazy be altogether reclaimed from the pleasant paths of idleness, although the modern system of superannuation in our public schools has an excellent effect in shaking up their sluggish minds and giving them a very definite stimulus to work. They know that, even although they may despise learning for learning's sake, a turning-point will come when a certain definite standard must be reached, and if they fail to pass what is really only a decent minimum they must turn out and make room for others. All their bright hopes of the future are gone; cricket elevens, football twenties, good places on the river must henceforth be regretful memories, their father probably now refuses to send them to the University, and they are placed in some dingy office where they must pass the dull hours scribbling at a desk. With all these disastrous consequences of failure before their eyes, some amount of industry becomes the rule, save for an occasional outbreak of silly nonsense which lays down that it is bad form to work, and by which little boys are actually prevented from working the mere force of public opinion. This, of course, is mere snobbery of the most contemptible

sort, and at schools frequented by those who have to make their own way in after life a much better tradition prevails. And as boys are now allowed to study with some reference to their future careers, they can pick and choose their favourite subjects within certain well-defined limits, and learn a considerable variety of things which will be of direct service to them in whatever profession they may afterwards adopt. So long as competitive examinations exist, so long will special grinders flourish on the preparation of candidates, and it will be idle to expect that a system of education which aims at general mental training can compete with men who have made the study of the individual idiosyncrasy of examiners and their probable line of questions the work of their lives. Paterfamilias, however, may reasonably expect that his boys will bring to their new task mental powers sharpened by systematic training, and able to direct themselves to new things with freshness and vigour.

And perhaps he may grumble less at their good physical development when he finds that they pass without difficulty that careful medical scrutiny which has been fatal to so many hopes. How often do we hear of the bitter disappointment which awaits some successful competitor who has passed through the

ordeal of trial with a magnificent total of marks, and comes before the doctor only to hear that some unknown weak spot has been discovered and that he is condemned to rejection. Perhaps his heart is weak, or his eyes are bad, or there is a tendency to hernia or to varicose veins or something else which makes him unfit for service, and which compels him to adopt some career far less brilliant and hopeful than that which his own industry had opened up to him in the examination-room. By all means educate the rising generation well—this is no world for stupid or ignorant people—but look carefully to their physical health, for competition runs high in body as well as in mind, and no one can hope under ordinary circumstances to succeed in life who has not a good constitution. So be consoled, Paterfamilias, your boys are strong and active and energetic, their skins are clear, their eyes keen, their limbs well knit, their muscles firm, their digestion is good, and their hearts in good working order; and if they have not acquired a stock of learning, they are honest and upright in mind as in body, they have acquired sound notions of justice and discipline and honour—in other words, they are English gentlemen. ‘Well,’ he may answer, ‘perhaps you are right; perhaps I have not done so badly by them after all,

but I have heard a good deal about bodily over-strain. They tell me that heart disease is much on the increase, and that a good deal of it is due to games played at our Universities and public schools. What have you to say about this? Perhaps my sons may have laid the foundations of something which may develop in after life, and ruin their constitution before manhood is half over.' Our friend's anxieties are not unnatural, and we will proceed to allay them as best we can.

And first as to the accusation that heart disease is on the increase in England. Is this true? We believe it is. The Registrar-General tells us that between 1848 and 1854, 5·2 per cent. of deaths were returned from heart disease, whilst from 1859 to 1869 the number had risen to 8 per cent., and this of course takes into no account the large amount of cardiac disease which either does not directly lead to the fatal result or which may be masked by other degenerative changes. Heart disease has undoubtedly been on the increase in the army in later years, and the same condition of things has been observed in the navy. Dr. Nathan, in a very interesting paper contained in the 'Service Medical Blue-book for 1872,' gives careful statistics in support of his statements. Now what is the explanation of all this? How

much of it is due to strain, and how much to other causes more directly connected with this age of wear and tear and feverish competition and anxiety? Perhaps materials are hardly forthcoming to give a complete answer to this question, but we may express our own confident opinion that the increase noted among the civil population, and affecting more particularly the busy and well-to-do classes, is rather in the direction of disorder of innervation than of the more direct valvular disease on which the attention of our predecessors in pathological study was more particularly fixed. If we take up the older books on practice of medicine, we will find the leading causes of heart disease to be rheumatism, scarlet fever, and Bright's disease, and the tendency to this complication or sequela has probably been lessened by improved treatment. The element of purely physical causes was not left entirely out of consideration, for cases were duly recognised in which, during some violent effort in lifting a heavy weight, one of the valves is torn across, but Virchow was undoubtedly the first to point out the degenerative effect of severe and long-continued muscular strain on the heart and great vessels. We know how common aneurism and various degenerative changes are in navvies and hammer-men and others who gain their living by prolonged violent

exertion, and there is every reason to believe with Dr. Hilton Fagge that the much greater liability of men than women to aortic disease after rheumatism is due to the greater physical efforts which the male sex are called upon to make. Dr. Nathan's explanation of the increase of heart disease in the navy runs in the same direction, pointing to the running drill, the increased size of naval ordnance, the greater distance aloft in some of the ironclads, and the diminished numbers of the crew; and Mr. Myers, who has written so well on army matters, tells us in his Alexander prize essay that aneurism is eleven times more common in the army than in civil life, and that it never falls to his lot to examine a soldier of six, eight, or ten years' service without finding some considerable evidence of cardiac hypertrophy, the cause being in his opinion the stiff unyielding nature of the tunic and accoutrements, compressing the chest and more especially the neck, and thus preventing the free expansion of the lungs and great vessels. The heart becomes in the first instance irritable and dilated, hypertrophy finally sets in, the heart is overworked from the mechanical impediment to the flow of blood, and the strain thus produced brings about the evils we have just named, as well as a tendency to atheroma

and aneurismal dilatation of the larger arterial trunks.

All this looks rather formidable, and may seem to bear out in every essential particular the accusation which we are setting ourselves out to refute, that games and athletics at our public schools are responsible for the admitted increase of heart disease. But a little examination will show that this contention can hardly be maintained. The evidence just adduced shows quite plainly that a great deal of strain is going on which causes bad results, but which takes place under conditions quite different from those under which our schoolboys and undergraduates are placed.

The strain on our labouring population is very severe and continuous, and often coincides with bad air and insufficient food, and worry and anxiety; and long after middle life has been reached, and after degenerative changes have begun in the arterial system, they have to work on until disabled by old age or disease. The causes predisposing our soldiers and sailors to cardiac affections have also that regularity and frequency of recurrence which make them dangerous, and in all three classes of the community we have to observe with regret the influence of drink and certain acquired cachexias as directly bearing on

the subject now under consideration. Compare this with the state of things at our public schools. The boys are well fed and clothed and housed, their work and play alternates in healthy proportion, their anxieties are of a very superficial kind, they have plenty of holidays, and a hopeful outlook in the future. And although the periodical scares which crop up from time to time in newspaper columns at dull seasons of the year are every now and then directed against athletic sports, we do not recollect any instance in which the case, which is usually supported with much dogmatic assertion and absolute security of conviction, has ever been well made out.

Football and gymnastics have in turn been made the subject of attack, but the most definite was that which culminated in the very important work of Dr. Morgan of Manchester on 'University Oars.' A very energetic controversy, started by the late Mr. Skey, had been raging in the *Times*, in which boating was held responsible for all kinds of evils, and Dr. Morgan, himself a Cambridge man, undertook a very laborious investigation in order to disprove what he felt to be erroneous conclusions. He found, after careful inquiry into the subsequent career of all who have taken part in the great inter-university contest since its foundation in 1829, that all but thirty-nine are

alive, and that whilst five seem to have injured themselves very slightly by their exertions, one hundred and fourteen wrote to express their strong conviction of the benefits which they had derived from this form of exercise.

Exception may of course be taken to this kind of evidence, that it is merely an instance of the survival of the fittest, and that many break down in training, but the answer to that is that only the sound and healthy are chosen in the first instance to compete for the coveted honour, and that rejection depends almost entirely on failure to come up to the requisite standard of style or endurance.

I have already said that I do not believe in any increase among the upper or middle classes of heart disease caused by strain, but there can be no doubt that affections of nervous origin are far more frequently met with now than formerly. The number of persons who die from angina pectoris, and notably in their first attack; cannot be noted without alarm, and medical men are continually consulted about palpitation and various irregularities of cardiac action which, if not remedied, may run on into organic disease. Prolonged worry and anxiety, sudden shock from grief or fear or pecuniary loss, all depressing emotion, and most especially prolonged watching by

a sick bed, may bring on slow and chronic degenerative change resulting in valvular incompetence, and frequently discovered by accident. The usual symptoms attending endocardial inflammation may have been entirely absent, and some functional disorder may have suggested a stethoscopic examination, with the result of discovering some hopelessly incurable form of disabling disorder. We cannot, of course, prevent all this; every one, unfortunately, cannot be rich and prosperous and happy, and it is all very well to preach a stoical attitude of philosophic indifference to misfortune which seems to have crushed out all hope; but this we can do, we can start our traveller on the journey with his nervous system in good order, his heart firm and sound, and his muscles in good trim. And this, or some approach to it, can best be procured by an intelligent and systematic athletic training in early life.

Intelligent because devised with care and carried out under the personal superintendence of the masters and medical officer, and systematic because regulated with method and order, things being done in their proper time and place, in their regular order and without excess.

One or two propositions may here be laid down.

1. Nothing in the way of games or athletics should be done on an empty stomach. Immediately before or after dinner are bad times for hard physical work, but a little gentle exercise such as that known at Rugby as 'punt about' may do good rather than harm.

2. Games are good morally as well as physically, and athletic training in early life improves the tone of the heart as well as the other muscles, and minimises the risk of inconvenient or dangerous strain in later years.

3. All boys in ordinary health are obliged at public schools to play at something, and the rule is a good one, for many of the more dreamy and sluggish-natured would simply mope and loaf about the ground and get no benefit out of the play-hour. It is well that they should be made to join something which they would never have had the energy to organise for themselves, and in the end they probably become enthusiastic patrons of cricket or football. Others of course are debarred from active exertion by constitutional weakness or some definitely disabling cause; but now and then the principal obstacle is parental over-anxiety, and the discretion of the medical officer may here come into play. I have several times whilst in medical charge of Rugby

School seen most excellent tonic effects produced on weak hearts by the judiciously-applied bracing influence of exercise, and on some occasions I have been enabled to do good service by encouraging boys to join in games in moderation who had been debarred from all participation in them and compelled to a dreary existence as a mere spectator. But the doctor may be of special service in exactly the opposite direction, in checking excess. Some boys tend to overdo everything; they have a feverish longing to excel all round, and whilst they are drawing largely upon their stores of nervous energy in school work, they are also struggling hard to keep in the front rank out of doors. The few instances of bad results from athletics which I have seen occurred precisely in such cases as these, where a heavy double strain is going on, and where a breakdown in one direction or another is almost inevitable. The school doctor should therefore go about freely among the boys, inspecting them in an informal way, seeing whether they are 'training off,' whether they are taking too much out of themselves, and whether a friendly word in season may not be required.

A very interesting question now arises with regard to the amount of physical infirmity or defect which must absolutely debar a boy from games. Anxious

parents often send their sons to school hampered by all kinds of restriction. They must not do this or that, football is perhaps prohibited, and it is specially laid down that the exercise taken must be of a very gentle kind. This is productive of a great deal of real misery, for the unfortunate lad is condemned to mope and loaf about, and to look longingly on at the active sports of his companions in which he is forbidden to join; and any prospect of release is eagerly welcomed. The medical officer will often be of real service by carefully examining such cases, and if he finds nothing wrong organically, and if only debility and languor is complained of, by using his influence in favour of a more active life; and he will often be rewarded by seeing a very remarkable stride taken in health and strength and muscular development by a gradual and progressive trial of various games, and more especially by a carefully regulated gymnastic course. But what about those boys who are either the victims of organic disease or who have some inherited diathesis so strongly developed as to render hygienic precautions necessary—what latitude in athletics may be allowed to them?

Supposing we are consulted about the case of a lad, say of fourteen or fifteen, who has a mitral bruit, but in whom cardiac symptoms are conspicuously

absent, and whose heart muscle is evidently sound and in good working order—what may he do? Football must, of course, be debarred on account of the pushing and squashing and struggling, and the liability to blows and falls, but he may play cricket or lawn tennis, and walk briskly, short of fatigue, and the exercise will undoubtedly do him good, not only as improving his general health, but as tending to brace and stimulate the physical and nervous energy of his heart, and most especially by improving his spirits and making his life more hopeful and happy. A consumptive boy will probably not be allowed to go to school, but if the disease be in a very early stage, or perhaps only hovering about, the lungs will not suffer by a moderate amount of active use. Indeed it is not unreasonable to suppose that the vigorous filling and emptying of the air cells will render them less susceptible to the intrusion of plastic deposits, and the increased bodily vigour attending the reasonable practice of athletics may prevent that tendency to ‘catching cold’ which always furnishes an element of danger to those inclined to pulmonary trouble. In the case of boys predisposed to insanity or various nervous disorders, vigorous exercise may prove highly beneficial, and may bring about such an improvement in the physical condition of the

brain as to enable this dangerous period to be tided over without actual outbreaks taking place.

We therefore record our emphatic belief in the advantage of athletic sports, which have an enormous advantage over less organised forms of exertion because, as Sir Erasmus Wilson well puts it, ‘in mind lies the great secret of beneficial exercise, and without it exercise is a misnomer and a fraud on the constitution.’ Parents, as we have already seen, sometimes grumble at the amount of time devoted to athletic sports, but if they could place their boys alongside of those of other countries, and note their superiority in every way, they would be well content to let matters remain as they are. A visit to a French academy will not impress us very much with the physique of the rising generation. The Germans, although they work systematically at gymnastics, suffer from school diseases in a much larger proportion than ourselves, and some portion of the dyspepsia of the Americans and the tendency to damage from overwork which has been so prominently referred to by Herbert Spencer is doubtless due to the conditions under which their youth are brought up.

As Sir Charles Dilke says in ‘Greater Britain :’—
‘Rowing and other athletics, with the exception of skating and baseball, are both despised and neglected

in America. When the smallest sign of a reaction appears in the New England colleges there comes at once a cry from Boston that brains are being postponed to brawn. If New Englanders would look about them they would see that the climate has of itself developed brains at the expense of brawn ; and that if national degeneracy is to be long prevented brawn must in some way be fostered. The high shoulders, head voice, and pallor of the Boston men are not incompatible with the possession of the most powerful brain, the keenest wit. But it is not probable that energy and talent will be continued in future generations sprung from the worn-out men and women of to-day. The prospect at present is not bright. Year by year Americans grow thinner, lighter, and shorter-lived.'

Now contrast this melancholy picture with the sound health and perfect condition of a typical specimen of our public-school boy or University man. We see in his clear eye and well-knit frame the proper balance of mind and body secured by the due adjustment of intelligently conducted exercise to progressive mental work, for while his muscles have been braced up, he has had the invaluable moral training of such a combination. Boating has taught him obedience and loyalty to his leaders ; cricket has made his sight as

keen as his arms are strong ; whilst football has given him that sense of coolness in emergency and rapid power of decision under conflicting circumstances which will stand him in such good stead in after life.

One of the most remarkable testimonies, however, in favour of the advantages of games has been furnished by Dr. Langdon Down, the leading authority on the subject of the treatment of idiots, who in a very interesting letter with which he favoured me some years ago wrote as follows :—

‘ Great difficulty was always found in effecting the combination of idiots in games of play. There was always a want of spontaneity about them, and great efforts were required to induce a spirit of emulation. I took great pains to carry out systematic training in the playground, and with some remarkable results. Those who made exceptional progress in this made co-etaneous progress in mental character. There is among idiots a great want of muscular co-ordination, and at the same time a want of endurance of muscular fatigue. They were for the greater part people of low physique, succumbed readily to illnesses that others would tide over. Some were agile, but they were the exception, and at a game of French and English with intelligent boys of far less weight they would be nowhere. They played at this

game, at racing, skittles, jumping over horizontal bars, leaping, &c. Some were employed on the farm, but they always avoided physical exertion. I made a strong point of carrying out physical training *pari passu* with the mental.'

A very good argument for games comes from the moral side, and this was very well expressed by Sir James Paget in some remarks made by him at a conference on school hygiene held at the International Health Exhibition on Friday, August 1, 1884. He said 'he held that the moral influence of English games was a thing to be esteemed even above their muscular influence. Our English boys were left to self-guidance, and developed self-government, mutual control, absolute command of temper, and absolute honesty in all their games. He considered it a dire sight to see boys out for what should be pleasure under the guidance of this person or that, directing how they were to do it, or how they were to behave in the doing of it.'

It is best, therefore, to let boys alone to regulate their own outdoor lives, and to arrange their own games according to unwritten laws which, if somewhat Draconic in their nature, reflect many of the best virtues of the English character, and are built up on honour and manly straightforwardness. Each school

has its own manners and customs, which must be rigidly obeyed, and which should not be interfered with unless undue roughness or other traces of excess seem likely to do harm to mind or body.

Football is probably the most popular of school games, and is played with a determined energy and systematic roughness which would seem to promise an abundant crop of serious accidents. When *Mater-familias* witnesses for the first time the wild charges, the hustling scrimmage, and the apparently ferocious pushing and kicking and struggling which fill her gentle spirit with dismay, she no doubt registers a vow that none of her sons shall be exposed to such unnecessary risks, and perhaps makes some attempts to carry her wishes into effect. But she will soon be consoled when she finds, much to her surprise, that nothing happens worse than an occasional bruised shin or sprained ankle, and that a contagious spirit of enthusiasm has sprung up in which she herself eventually shares, as she exults in the prowess of her boys in this and other manly sports. Whilst at Rugby I preserved careful notes of every football casualty occurring during my tenure of office, and was surprised to find how insignificant the total actually was. From time to time some severe, perhaps fatal, casualty is reported, and the tide of public

opinion begins to set in against the game, parental alarm being duly fed by the solemn warnings of the press and the dogmatic utterances of sentimental philanthropists. But it is clearly impossible for any sport to be indulged in without some trifling modicum of risk, and the zest and keenness of interest which are excited are often in proportion to the difficulties, and even dangers, which have to be surmounted. A scrap of orange-peel or a passing hansom cab may make a simple walk as perilous as the battlefield; and we must remember that the worst football accidents occur away from our public schools, and among young men who play with more unrestrained energy than boys, and at a time of life when injuries are more readily sustained and less readily repaired. But whilst fully convinced that the risks of this game are exaggerated, we must be none the less careful to obviate their occurrence as far as possible by careful supervision. It is important that both the head-master and the school doctor should visit the playing-fields from time to time to check any irregular practices, and more especially to protest against hacking and scragging. In the first of these damage may be done to the tibia by the savage and purposeless kicking which used to be commonly practised, but which a more healthy tone of feeling

has almost stamped out; and scragging means the violent forcing of the head and neck forward during the 'tight scrimmage.' From this foolish and unnecessary practice we have seen one serious and nearly fatal accident.

Cricket is *par excellence* the English game, and on every village green we will see the rustics standing up before the wickets in more or less imperfect fashion, and batting and bowling with the best imitation of science at their command. At public schools it stands high in social esteem, and the ambition to get into the Eleven is, we fear, often much keener than to attain to the honours and glories of the sixth form. From the purely athletic point of view, however, its merits are not great, because after the innings is over there may be nothing more to do during the day, and even fielding may mean little more than standing for hours in the hot sun waiting for balls which persistently go in other directions. There is, I believe, a well-founded apprehension that lawn tennis may prove a formidable rival to the older game, and its popularity is undoubtedly very great, and increasing rather than falling off. For not only does it furnish the machinery for active but not too violent exercise, to be taken at all seasons of the year, but moderate proficiency has not yet been abso-

lutely overborne by the greater perfection of others who are practically professionals, and who are naturally intolerant of mediocrity. A very second-class player can always meet with some foeman worthy of his steel, and as ladies are always ready to join, not only are great social advantages thus secured, but the standard is kept from being forced up to a pitch which excludes those who merely play for ordinary amusement.

On a level with cricket we must place rowing, which, although not so universally attainable, seems to take a great and very permanent hold on the affections of boys, who divide themselves with considerable determination into the rival although not hostile camps of 'wet bobs' and 'dry bobs.' Much has been written both for and against boating as a form of athletic exercise, and it has found its vigorous opponents as well as its enthusiastic supporters. The late Mr. Skey, in a letter to the *Times* in 1869, startled the public mind by a graphic, if somewhat fanciful, description of the evils which he had seen and heard of from strain; and Wilkie Collins, in his novel of 'Man and Wife,' gave a fantastic and altogether imaginary description of what he considered to be a type of rowing-men. We have already referred to Dr. Morgan's important book, and the evidence of

doctors practising at our Universities and public schools does not supply us with any alarming list of casualties from rowing, which may therefore be looked upon as an excellent exercise, developing nearly all the more important superficial muscles, improving the wind, and increasing the general bodily vigour. But in order that the maximum of good may be obtained and any chance of harm prevented, we must be careful that a certain amount of regulated training must here, as elsewhere, lead up to violent exertion, and that no unprepared person should be encouraged to get into a boat and begin rowing rapidly up to exhaustion point. We know what happens under these circumstances, or when some one of a sedentary habit tries to run a few yards at his best pace. The first symptom is breathlessness, resulting from the rapidity of respiration necessary to receive and aërate the blood sent to the lungs by the heart at perhaps double the normal rate of progression, the pulse is quick, feeble, and perhaps irregular, the face is pale and anxious, the forehead bedewed with clammy sweat, and sensations of nausea and faintness are experienced in greater or less degree according to circumstances. As the author of 'Exercise and Training' well puts it:—'The chief object of the work in training is to establish a reci-

procal action between the heart and lungs, so that the increased supply of blood sent to the lungs by the heart may pass through them freely, that there should be no blockage and consequently no strain.

‘This reciprocal action will be best attained by gradually increasing the respiratory work, otherwise the immediate effect of fast exercise being to cause augmented action of the heart, the increased amount of blood sent to the lungs will cause embarrassment to the respiration, a checking of the flow of blood through them. This causes more violent breathing efforts, which may lead to expansion of the air vesicles of the lungs (emphysema), or dilatation of the heart.’

The true secret, then, of boating and running, or anything of the kind which calls for sudden exertion of a rapid and concentrated kind, is that it should be taken gradually and developed slowly and carefully, and with strict relation to the state of the bodily powers, the principles just laid down being rigidly adhered to. It is almost unnecessary to give the caution that no boy should be allowed to enter a boat until he has learned to swim, which is itself an excellent form of exercise.

Gymnastics.—We have already listened to one grumble from Paterfamilias about the amount of time

expended on games, and we hope we have convinced him of the importance of a sound physical development for his sons, if they are to be successful competitors in the battle of life. 'But,' says he, 'granted that they must play football and cricket for so many hours in the day, surely the addition to the athletic curriculum in most public schools of a regular course of gymnastic training must be quite unnecessary? When boys are able to take free and well-organised exercise in the open air, why shut them up in a stuffy building, and oblige them to perform certain complicated manœuvres with dumb-bells and trapezes and horizontal bars, which are not only monotonous and uninteresting, but which will most probably strain their hearts and injure their constitutions.' Now this may sound plausible enough, but we feel certain that Paterfamilias will again come round to our side when he listens to the evidence for the defence. Ordinary games are admirable in their way from the moral as well as the physical standpoint, but they are apt to produce partial muscular development, as Mr. Maclaren tells us in his admirable book.

Gymnastics, on the other hand, bring all the superficial muscles which preside over ordinary motion into harmonious and symmetrical action, and form, therefore, an excellent addition to the other varieties

of active exercise which are in habitual use. They can be carried out at all times and in all weathers, but it is very essential that a regular course under careful and scientific instruction should be laid down, and that boys should not be encouraged, or indeed allowed, until they have passed through certain definite standards of proficiency, to practise on their own account. We are quite of opinion that this course should be made compulsory on all physically fit boys for at least two or three terms, according to the progress made, but much time need not be sacrificed, as two hours of regular instruction a week will prove sufficient, and this should be deducted from the school rather than the play hours. When a reasonable amount of skill has been attained, private practice may be encouraged; but as the taste for this form of exercise rapidly grows, it may be well to lay down a maximum of one hour a day, which will be amply sufficient when taken along with the other work of school routine.

Experienced instructors have related to me in very graphic terms how thin and narrow and stunted boys have developed rapidly into strength and vigour under the expanding influence of well-regulated gymnastic training, and have said at the same time that bad effects or accidents are extremely rare.

Captain Tudor Risk of Harrow writes to me as follows :—‘In all cases of deformity, such as one-sided growth, unequal development, pigeon-breast, &c. &c., I have noticed most marked improvement speedily follow the commencement of gymnastic practice, and in the continuance of practice these defects entirely disappear. Of course I refer to such cases as are possible of cure by these means, and also to the judicious, not indiscriminate, use of gymnastic exercises. Expansion of the chest and development of muscles which would otherwise be unemployed, and equalisation of strength over the whole body, together with quickness, smartness, and readiness in adapting the limbs and body to their various requirements, are among the other benefits derived. I think a most casual observer could easily detect among a number of boys those who use the gymnasium from those who did not by their superior bearing, and this I have often heard remarked here. As to evils I confess I do not know of any. Of course there *are* accidents, but they are very few, and every care is taken to avoid anything in the way of sprain, or of undue exertion of one part of the body more than another, by the gradation of exercises according to the strength of the learner. The various machines are arranged so as to bring each of the various muscles

into play, and I make it a rule not to allow boys to attempt advanced exercises until they have qualified themselves by the performance of those of a more easy character.'

This testimony from a skilful instructor of eleven years' standing is a sufficient reply to the objections made by Paterfamilias, and will doubtless reconcile him to look with favour on a system of physical education which is productive of so much good, and which seldom, or never, if rightly managed, does any harm.

One definite accusation made against gymnastics is that it stunts the growth, and tends to produce a race of short, squat men and women. Any actual proof of this is naturally impossible, as no one could venture to predict what the height of any given individual might have been had he never entered a gymnasium, and for the same reason arguments on the other side must be mainly conjectural. No one, however, would venture to deny that excessive physical exertion *may* check growth by exhausting nervous energy and interfering with nutrition, but if what we have already said about the benefits of athletics be true, they are more likely to encourage than to limit a healthy physical development. Experienced instructors at our large public schools and elsewhere

are not disposed to believe that a well-regulated muscular training is likely to diminish the stature of the rising generation. But we can understand how the notion has arisen. Gymnastics broaden the shoulders and thicken the limbs, and a boy after passing through his course thus actually, by a sort of optical delusion, looks shorter than some of his lanky weedy companions, who may really prove on measurement to be of the same height or even shorter. And thus some of the general public, never very eager to verify their impressions by facts, have come to the unfounded belief that gymnastics stunt the growth. Whatever truth there may be in this, however, and we believe that there is none, there can be no doubt about the influence of gymnastic training in aiding muscular development. Most instructors keep registers, by means of which they can observe the increased size of the biceps and the muscles of the fore-arm and back and shoulders, and the gradual way in which the chest expands by the opening out of hitherto unused air-cells and the better filling of those hitherto in use. Well-kept measurements of this kind, along with a record of weight and height, possess great physiological interest, but before their study can be made profitable we must first inform ourselves thoroughly of the normal proportions of the

human body at different ages, and the natural rate of increase under perfectly healthy conditions. The accompanying table is taken from Mr. Roberts's well-

TABLE I.—SHOWING THE AVERAGE PROPORTION AND GROWTH OF THE HUMAN BODY FROM BIRTH TO MATURITY.

Age last birthday	Average proportions of the body (males)			Annual rate of growth			Ratio of increase Height=Unity		
	Height	Chest-girth	Weight	Height	Chest-girth	Weight	Height	Chest-girth	Weight
	Inches	Inches	lbs.	Inches	Inches	lbs.	Inch	Inches	lbs.
Birth	19·34	13·25	7·55	—	—	—	—	—	—
1 year	28·50	—	—	9·16	—	—	—	—	—
2 years	31·60	—	—	3·10	—	—	—	—	—
3 "	35·00	—	—	3·40	—	—	—	—	—
4 "	38·45	—	31·10	3·45	—	—	—	—	—
5 "	41·15	21·26	37·71	2·70	—	—	—	—	—
6 "	43·18	21·68	40·67	2·03	0·42	2·96	1	0·20	1·45
7 "	45·15	22·25	44·00	1·97	0·57	3·33	1	0·28	1·70
8 "	46·92	22·66	47·15	1·77	0·41	3·15	1	0·31	1·80
9 "	49·52	23·27	51·20	2·60	0·61	4·14	1	6·24	1·60
10 "	51·52	23·77	55·50	2·00	0·50	4·21	1	0·25	2·10
11 "	52·87	24·33	60·15	1·35	0·56	4·65	1	0·41	3·44
12 "	54·45	24·81	64·52	1·58	0·48	4·37	1	0·30	2·76
13 "	56·56	26·30	71·00	2·11	1·49	5·48	1	0·70	2·60
14 "	58·55	28·18	79·57	2·00	1·88	8·57	1	0·94	4·28
15 "	60·77	29·70	91·43	2·21	1·52	11·86	1	0·68	5·36
16 "	63·42	31·19	107·86	2·65	1·49	16·43	1	0·56	6·20
17 "	64·95	32·80	118·08	1·53	1·71	10·22	1	1·10	6·67
18 "	65·69	34·03	127·25	1·73	1·23	9·17	1	0·70	5·27
19 "	66·37	34·76	131·48	0·68	0·73	4·23	1	0·10	6·22
20 "	66·80	35·13	135·28	0·43	0·37	3·80	1	0·08	0·90
21 "	66·80	35·42	135·03	0·00	0·29	0·00	—	0·00	0·00
22 "	66·80	35·41	134·50	0·00	0·00	0·00	—	0·00	0·00
23 "	66·80	35·45	134·08	0·00	0·03	0·00	—	0·00	0·00
24 "	66·95	35·43	133·26	0·15	0·00	0·00	—	0·00	0·00
25 to 30	67·07	35·48	135·00	0·12	0·03	0·00	1	0·13	0·00
30 " 50	67·03	—	138·33	—	—	—	—	—	—

known paper,¹ to which we must refer our readers for a fuller account of the very elaborate detail which he has put together with so much ability and perseverance.

In considering the absolute height, the growth is most rapid, according to Quetelet, in the first year, when it amounts to about $7\frac{3}{4}$ inches; during the second year it is already reduced one-half, being a little less than four inches, and becomes gradually less till the age of twelve, when it is reduced to about $1\frac{1}{2}$ or 2 inches, according to the social condition. With the accession of puberty there is, according to my observations, an increased rate of growth in the non-working classes, and an entire cessation of it at the age of nineteen or twenty years, while in the working classes the growth is more uniform, and extends to about the twenty-third year. The height of woman is less than that of man, for three different causes—first, the woman is born a little smaller; second, her annual growth is a little feebler; and third, her growth terminates about two years before that of man. It is to this last cause above all that the difference in height must be attributed; for while at the age of thirteen girls are a little taller than boys, at the period of full development women

¹ 'On the Physical Development and Proportions of the Human Body.' By Charles Roberts, F R.C.S. *St. George's Hosp. Reports*, 1879.

are nearly four inches shorter than men (Roberts). As regards weight, it appears that this is tripled during the first year after birth, that the relative increase diminishes in degree from the second to the eighth and ninth years, when it is most feeble; after the age of nine a rapid increase sets in, and culminates in an annual growth of sixteen pounds in Mr. Roberts's English returns, but of only nine and a half in some Belgian statistics quoted by him.

The following table from Roberts's paper shows the relation of the heights and weights of 430 public-school boys between the age of eleven and twelve years:—

TABLE II.

Heights in groups of 2 inches (without shoes)	Number of boys	Weight in groups of 7 lbs. (including clothes)	Number of boys
60 to 62	3	98 to 105	4
58 „ 60	16	91 „ 98	15
56 „ 58	58	84 „ 91	62
* 54 „ 56	133	77 „ 84	133
52 „ 54	137	70 „ 77	129
50 „ 52	64	63 „ 70	77
48 „ 50	16	56 „ 63	10
46 „ 48	3	49 „ 56	?
Total	430		430

* Mean.

Mr. Street has also contributed an interesting paper on the same subject, and has examined 3,695 boys varying from thirteen to nineteen; and, starting

from an average height of 55 inches at the age of thirteen, at fourteen he found an increase of 1 inch in the year, from fifteen to sixteen 3 inches, and from sixteen to seventeen 4 inches. From seventeen to eighteen give 1 inch, from eighteen to nineteen 1 inch, after which the period of active growth may be said to be over. Both observers agree in showing that from fifteen to seventeen the greatest development of height and weight is going on, and this may be looked upon as a somewhat critical time, when strain or overwork or bad hygienic conditions generally are most apt to leave their mark on the physical development.

But in addition to cricket and football, and rowing and rackets, and fives and gymnastics, there are plenty other means for taking active exercise which may be used with benefit. House-runs and paper-chases are very popular, and have considerable value as promoting that reciprocal adaptation of heart and lungs to meet the requirements of suddenly-augmented work which makes a man quick on his legs and always more or less in good wind, so that if in after life he has to run a few yards to catch a train, or if he is obliged to make some violent movement to avoid an accident or to save himself from sprain or injury, he will not suffer in prolonged breathlessness or obstinate stiffness, or even in worse ways.

Gentler exercise may be taken by joining botanical or geological excursions, and the rifle corps always attracts a considerable following of those in whom the military instinct is early developed, and who learn to appreciate the advantages of drill in improving their gait and carriage. One caution is necessary, and that is to see that commanding officers do not get led astray by the passion for smartness which has done so much harm in the regular service, and that tight tunics and narrow collars and stocks and constricting cross-belts do not exercise that pressure during the period of active growth which must seriously interfere with the proper development of the chest.

Singing may be looked on as a form of gymnastics, and should be made compulsory. Not only does it encourage a musical taste which might otherwise have remained dormant, but it develops the larynx and the chest, it improves the voice for public speaking, and adds to that moderate amount of self-confidence which is so necessary to ensure success in any walk of life.

We have already expressed our opinion that boys at public schools lead such regular and healthy lives and take such varied exercise that any systematic training regulations are hardly necessary. But the

question may be put, What are the best rules in case anything of the kind is required? and some such scheme as the following will be found to work well.

Rise about seven, and immediately afterwards take a glass of milk or a cup of *café au lait* with a bit of bread, wash the face and hands, but defer bathing until the return from the morning exercise, which may consist of a smart walk, or, even better, a slow run of two or three miles, varied by occasional spurts, increasing in length and severity as the 'wind' improves. The bath which follows should be cold, as a rule, but in the depth of winter the edge of the chill may be taken off by a little hot water, and after brisk sponging and the vigorous application of a rough towel, dressing may be leisurely finished, and breakfast begun. This should be a pretty substantial meal, and may be extensively varied according to taste. Tea has always been preferred by trainers, for what exact reason is not shown, and as coffee has already been taken, the variety will be agreeable, and one large cup will be enough, sugar and cream being added as fancy inclines. Whole-meal or brown bread is better than white, good butter should be freely used; if jam or marmalade is relished there is no reason why they may not be allowed in moderation—in fact we have already spoken of the importance of

sugar as an article of diet. Watercresses and fresh fruits in their seasons are valuable adjuncts, and when we come to the *pièces de résistance* it is well to ring the changes on the perpetual chop and steak of the old-fashioned trainer. Two or three times a week is often enough for their appearance on the table, and eggs and bacon, soft boiled eggs, fish, broiled fowl, game, ham, or tongue will be relished as substitutes, nor must we forget the claims of porridge, a small plate of which, with good milk, forms an excellent first course. For a few hours after breakfast there is usually some school or college work to be done, but half an hour or so of gymnastics will give all the muscles a stretch, and fencing, single-stick, or sparring may be indulged in, care being taken to see that the gloves are not too hard, as noses have been flattened or broken, faces cut, and tempers seriously damaged by a boxing bout under such conditions. At about one, lunch will be welcomed, and should be light in quality, consisting of soup, or bread and butter, or a slice of cold meat washed down by water, which any one taking active exercise will soon learn to prefer at this time to any form of alcoholic drink. Under certain conditions, as, for instance, at public schools, the principal meal of the day will be taken at this hour, but we must point out how much better it is

not to overload the stomach with food whilst violent exertion is being taken, and how preferable the arrangement is which enables the young athlete to dine when all his work is over. Of course a boy cannot expect to override all settled rules and regulations simply because he happens to have prescribed for himself a certain course of training, the principal difference being that after his mid-day dinner he must allow a somewhat longer time to elapse before beginning to run or row than if merely a slight lunch had been taken.

At half-past two or three o'clock the principal exercise of the day is begun, and if no river is near this may consist of another run of three or four miles, but an active game of football or anything else of the kind will answer the purpose equally well. If rowing be the object of ambition, 'this for college races usually consists in rowing about one mile at full speed, three miles at three-quarter speed, and one and a half mile at half-speed. Long-distance rows at three-quarter speed should be adopted twice a week; on those days the course would not be rowed at full speed. The time spent on the river should not exceed, when the course is rowed, more than one hour and twenty minutes; when the long journey is made, about two hours and a quarter should be allowed. If more

time is required the crews should start earlier, so as to return at least an hour and a half before dinner.’¹

On return a good rub down will be refreshing, and as an hour and a half or two hours will elapse before the next meal, a small cup of tea or a glass of weak beer will refresh exhausted nature and relieve thirst without spoiling the appetite. Six is a convenient hour for dinner, and as it is very essential that a good meal should now be taken, variety and careful cooking should be specially attended to, and a clean sweep made of all the fads of professional trainers. Roast and boiled meat are excellent things in their way, and should be given from time to time, but they should be varied by poultry and game and fish, and even by entrées, which under the name of kickshaws are still looked upon with suspicion by the typical middle-class Englishman. If any one undergoing training should be able to command the services of a skilled cook, he will find it far better to eat in moderation of most of the dishes placed before him than to cultivate an affected asceticism contrary to the dictates of nature. There is no reason why a plain rumpsteak should be more nourishing than one or other of the varieties of ‘filet’ which culinary ingenuity has devised; a côtelette à la Soubise, or

¹ *Exercise and Training.*

‘Reform’ contains as much nitrogen in as digestible a form as a plain mutton chop; and stews and hashes and curries vary very agreeably the monotony of the fare. Good vegetable soups are strongly to be recommended, and stewed fruit and simple rice, tapioca, sago, or bread puddings should be preferred to pastry, which introduces an unwholesome alliance between flour and butter which many stomachs resent. A bit of cheese is a good wind-up, bread should not be stinted, and care should be taken to provide plenty of plain boiled potatoes and green vegetables, the importance of which from the dietetic point of view can hardly be over-estimated.

If alcohol is to be taken at all, now is the time for it to make its appearance, and a pint of beer or a glass or two of fairly good claret will usually be found to be of use as improving the appetite and removing the traces of fatigue. Some remnants of superstitions still cling about old ale and port-wine, but the former is seldom palatable, and the latter is often new and bad, so we advise our readers to stick to simpler drinks, and more especially to try and attain to the maximum of refreshment with the minimum of alcohol. Spirits should be shunned like poison, and the stronger brandied wines most carefully avoided, the best stimulant of a superior kind, if such be re-

quired by debility or depression, being a little dry champagne in the shape of some one or other of the 'Brüt' vintages now so much in use.

About two hours after dinner a cup of weak tea will rather promote digestion than otherwise, and at ten some kind of supper may be taken, consisting of bread and cheese and a glass of beer, or, better, of porridge, which is generally very popular at this time of night. Half an hour later our aspiring athlete should be in bed, and we may confidently venture to wish him sound sleep without dreams.

Now it will be seen that the above sketch of an ideal system of training does not differ very materially from the ordinary lives of healthy boys or young men, and that in particular it gives no encouragement to those hard and fast rules of monotony of diet which so often made athletes plunge into excesses both of food and drink when the time of release came.

Professional runners and others who specially cultivate their powers are not by any means an unsound or short-lived class if they give their constitutions fair play, but the tendency too often is to oscillate between periods of extreme regularity and sparing moderation and those of conviviality and excess, rendered far more enjoyable by the force of contrast. We do not know whether trainers still pursue the same stern *régime* as

formerly ; whether they begin their work by purgative medicines 'to remove the crudities of the stomach and bowels and have a clear point to start from ;' or whether, 'if the person trained after the second week exhibits signs of irritability, he must be bled and purged well and take a dose of a powerful cathartic. Vomiting may be used when the stomach is foul to get rid of the crudities not cleared by the purging. This radical cleansing is absolutely indispensable to bring the organs of digestion to a healthy state of action.' I fancy the rising generation are now too sensible to submit the care of their health at a very critical time to the charge of retired pugilists and boating men, and that they would unanimously revolt at being physicked in a way which rather suggests the washing out of a sewer than the rational treatment of a human being. Any domestic tampering with drugs is almost invariably bad, and if any symptoms of 'training off,' such as pallor, depression, want of appetite, boils or skin eruptions, or disturbed sleep show themselves, the doctor should at once be consulted and his advice followed with faith. And if it be his duty to tell his patient that training does not suit him, that he is overtaxing his strength, and must at once retire into private life, let the unpalatable truth be accepted without grumbling or argu-

ment, but with a feeling of satisfaction that the drag has been put on before any real harm has been done.

Perhaps in no other respect has more progress been made of late years than in the physical training of girls. We all know what their chances of exercise were a quarter of a century ago. For the first ten or twelve years of their lives they were allowed to run about with their brothers on tolerably equal terms, and to play cricket and other games without special reference to sex. But when school time arrived they drifted widely apart. The boys when they came home for the holidays despised the girls, and would only let them join in their outdoor occupations with a sort of condescending sufferance; and their sisters, on the other hand, having been by this time taught that mixing in rough games was unlady-like, contented themselves with such forms of active exertion as their fashionable clothing would permit. When at school they were sent out once a day on that dull spiritless routine promenade so familiar to residents in our suburbs, and so dreary and monotonous to those who were compelled to take part in it, and except when they came out and began ball-going or could afford to ride, their muscles hardly ever got the chance of a good stretching. As the natural result of this, women grew up narrow and weak and

flabby, apt to fall into permanent ill health on small provocation, and altogether unfitted for their responsible task of motherhood to the rising generation.

Great improvements, however, have recently been effected. In almost every well-arranged school some system of gymnastics has been introduced, which, without the necessity for elaborate machinery, provides that regulated and systematic physical exercise which expands the chest, tightens the joints, and hardens the muscles into vigorous activity. Miss Buss, at her excellent institution in North London, frequently interrupts lessons and turns the girls into a large hall, where they perform a well-arranged series of calisthenic exercises to brisk pianoforte music. And Miss Creiman, who has done so much for the 'scientific physical training of girls,' has introduced many improvements which are described in her little book with the above name.

Work under her system is usually begun with a vocal march, light dumb-bells, poles, clubs, rings, skipping-ropes are used, movements of resistance are executed by the opposed action of two pupils of fairly equal strength, and a series of ball exercises are found 'useful in providing varied and graceful exercise, and for unconscious cultivation of accuracy and precision of movement, sense of time,

and regulation of force expenditure to the desired result.'

Of considerable value are the movements which she has devised for the gymnastic exercise of the hand, no apparatus being necessary; 'but elasticity, freedom, and force may be given to the muscles, joints, ligaments, and tendons of wrist, palm, and digits by the habitual practice of very simple antero-posterior, transverse, and circular movements of the wrist, and by flexor, extensor, and rotatory movements of the fingers.'

'The exercise of beginners should be conducted with the greatest method and care; the general capacity of the pupil should be ascertained, and any local weakness well considered. After twelve years of age jumping and leaping exercise should, I think, be very sparingly indulged in by girls.'

Miss Bergman, superintendent of gymnastics to the London School Board, has favoured me with the following remarks:—

'Ling's Swedish gymnastics were introduced in the London Board Schools five years ago. About three hundred and fifty teachers are trained at present, and about twenty thousand girls derive the benefit of their instruction. It is a hard task for the human frame to bend over the school desk hour after hour. The result

of this contraction of the muscles of the chest is seen in our schoolgirls, who, with few exceptions, are abnormally round-shouldered and narrow-chested. Another mischief produced by the bad position during reading and writing is the different position of the shoulders—one generally much higher than the other. For these reasons and for many more, I think it indisputable that physical exercises introduced between the lessons are a great boon for growing children. I should like them to have about ten minutes' practice between each lesson, the room being well ventilated.

‘Gymnastics are not compulsory in our Board Schools (save military drill for boys), and it wholly depends upon the good will and good sense of the head-mistress if they are practised in her school or not. I generally ask for a quarter of an hour's practice in the morning in place of one long lesson in the week, as the daily grinding gives the healthy result, whilst the long lesson often makes the children tired.

‘Ling's Swedish gymnastics include “free exercises and exercises on apparatus.” The first mentioned can be performed between the desks or on the forms in even the more crowded rooms. We do not use any weights whatsoever (dumb-bells or bars). If heavy, they impede the freedom of respiration; if light, they are only for show. We condemn singing practised

at the same time as physical exercises, as perfect rest is the right condition for the proper use of the voice.

‘We try to make each student do what is good for her individually, and we oppose everything acrobatic.

‘The following is a scheme of the lessons usually given :—

‘1. Exercises for the muscles of the feet and legs.

‘2. For the muscles of the back and neck.

‘3. Climbing movements, and arm extension exercises.

‘4. Balance movements.

‘5. Exercises specially for the muscles of the shoulder-blades.

‘6 and 7. For the abdomen and side of the body, such as turning and bending to the side.

‘8. Marching, running, and leaping.

‘9. A slow movement of the arms.

‘After this plan each part of the body is exercised, and we see a great difference between the girls who take gymnastics and those who do not. And every unprejudiced teacher will acknowledge this.’

Girls, therefore, will get plenty of athletic exercise by following the principles laid down by Miss Creiman, Miss Bergman, and others. And it is not necessary, or even desirable, to encourage them to attempt those feats on the horizontal bar or the trapeze or

on the other special machinery of the gymnasium which find so much favour with the opposite sex. Here as well as in mental work nothing but mischief can follow the practical adoption of the theory that women are the equals of men, for, with many admirable qualities of their own, they want the force and weight and capacity for sustained exertion which must always place and keep males in the front rank, and it is well that this undoubted truth should be universally accepted. We wish our girls to grow up well knit and active and healthy, but broad shoulders and sturdy hands and thick biceps are as unnecessary for their physical perfection as they are likely to mar their success in life from the æsthetic standpoint, and we therefore deprecate any kind of active exertion which tends to carry muscular development beyond our ideal of feminine grace. Nor must it be forgotten that girls from the specialities of their anatomical construction are peculiarly liable to strain, which may be the starting-point for lifelong ill health, and it is, therefore, most important that during the period of growth, and more especially at puberty, anything of this sort should be very carefully guarded against. Rough games, therefore, even if desired, should be forbidden, but lawn tennis and archery and the different varieties

of extension movements to which we have directed attention may be prescribed in full dose, and with the conviction that they will be found to prove very formidable competitors to the most renowned tonics in the Pharmacopœia. In after years women are now enabled by custom to take a much more active part in open-air life than formerly, for not only do they hold their own in the lawn-tennis court, but in the hunting field and even on the river they take a good place and seem none the worse for their exertions; and instead of moping indoors during the greater part of the day, whilst the male portion of creation are enjoying their more cheery and active existence, they now put on their short dresses and their thick boots and start away for a brisk walk or a tricycling trip, or perhaps accompany the shooting party during some part of the afternoon. And as a natural result they are now stronger and brighter and more healthy than formerly, and the rising generation will feel the benefit of the change.

This may be a convenient opportunity of saying something about dress, because the more the physical education of women progresses, the less sympathy will they have with the vagaries of fashionable millinery. When they are regularly launched into society they will be compelled to obey its dictates

and to wear tight or loose dresses, long or short, as the case may be, to gird themselves around with crinoline or crinolettes, and to totter about on high heels because other foolish people do the same. No words that we or any one else can say will prevent women from adopting costumes which may both be unhealthy and ridiculous if fashion ordains that such things must be worn, nor will any amount of advocacy, however enlightened, succeed in popularising the divided skirt or in abolishing stays. Scientific men will go on preaching, and fine ladies will probably go on treating their advice with indifference, up to the end of the chapter, and as they have presumably reached years of discretion, they must be allowed to pursue their course unchecked. But girls are under parental control, and care must be taken to see that the arch of their instep is not broken down by a premature devotion to high heels, that the expansion and development of their ribs and lungs are not prevented by tight stays, that a too great weight of clothes is not allowed to depress their energies.

Of course when doing gymnastics they must be loosely clad, and Miss Creiman suggests the following as a convenient form of costume:—‘The gymnastic costume worn by my pupils is a short princesse robe of navy-blue satara cloth, with knickerbockers of the

same (satara cloth is a soft, light, durable woollen material). A broad sash of "cardinal" cashmere is also worn, this being made use of as a support during certain exercises, and a throat and chest wrap in passing to the dressing-rooms after exercise. Now that jerseys are so neatly made, they are sometimes substituted for the upper part of robe, a skirt attached to a bodice of thin material being worn beneath them. The costume can be readily adapted for ordinary school wear. Stays, unless of such hygienic make as to allow of perfect movement and full respiration, are forbidden, as are also "heels."

Girls will, no doubt, rebel not a little at being debarred from fashionable things which they admire in others, and which they fondly believe are essential to gain the appreciation of the opposite sex, but they would be consoled did they but know that pinched-in waists and the wriggling gait engendered by modern boots are rapidly becoming regarded as deformities by sensible men. And when they are told that the symmetrical development of their figures, that their freshness of complexion, that the integrity of their nervous systems, and probably the usefulness and enjoyment of their future lives may depend on a little self-restraint and self-denial during youth, they will probably consent without a murmur to forego the

advantages they erroneously consider to be derived from adopting all the vagaries of fashion in their most extreme development.

Boys will be much more easy to manage. They are subject to curious fads and customs, objecting sometimes to the use of great-coats and occasionally shivering throughout a winter's day with nothing but a thin linen shirt next their skin. It will not be difficult to convince them that flannel should be worn during exertion, and if they should show any leanings to the sharply-pointed boots and shoes which are now so much in vogue, a demonstration of a natural foot side by side with one of the productions of a modern artist in leather will show them how disastrous must be the attempt to squeeze nature's work into the rigid armour of man. Very great harm is often done by allowing growing boys to wear short or narrow boots and shoes, and the overlapping toes and corns and bunions and ingrowing nails which form a considerable part of the minor physical miseries of advancing years have usually been manufactured at this period of life.

In the same way that scientific men have laid down diet scales of the precise quantity of food necessary to sustain full health under varying conditions of life, others have told us in accurate detail

how much exercise we ought to take per diem. Professor Parkes, admittedly the highest authority on hygiene, in his classical book has made an elaborate calculation of the force expended per diem by a man engaged in labour in the open air, averaging from 250 to 350 tons lifted one foot, and argues from this that a healthy adult may walk nine miles a day without incurring the risk of over-fatigue.

It must be admitted that this statement should be very considerably modified according to circumstances, for it would be a mere mockery to prescribe for the hard-worked inhabitants of our large towns an amount of physical exertion which they have neither time nor strength to undertake. Ordinary people could not walk nine miles in less than from two and a half to three hours, nor would it be wise for them to attempt to do so, and this large slice out of the already overcrowded hours of the working day cannot be spared. And, furthermore, if a busy man, rising late in the afternoon from his desk, were to start off on a pedestrian excursion of this extent in the enervating atmosphere of London, he would soon be made painfully aware that he had overtaxed his strength and done himself harm rather than good. Under ordinary circumstances from three to four miles will be an ample allowance, to be gradually extended during

vacation time, and supplemented occasionally by more active exercise in the way of field sports. If a medical man were asked his opinion as to the precise amount of games which may safely be played by healthy boys, he must of course profess his inability to lay down an exact scheme in miles or foot tons; but at the same time he may refer his questioner to the arrangements in vogue at our great public schools, which seem in a general way to have hit off the amount of active exertion which may be safely taken.

V.

THE DUTIES OF THE SCHOOL DOCTOR.

THE remark is, perhaps, not an unnatural one, 'In what respect do the duties of a school doctor differ from those of an ordinary practitioner, and why is it necessary to devote a chapter of this book to their consideration? Medical practice surely must be carried on in all cases according to certain well-defined rules and principles, and standard works on medicine and on hygiene will probably supply all the needed information.' Granted that this is true in the abstract, it must also be evident that certain specialities are met with under the varying circumstances of professional life which require special study and which fall somewhat outside the scope of systematic handbooks. And my own experience in medical charge of a large school has shown me that the varied, responsible, and often delicate duties devolving on those to whom such important functions are committed have usually to be learnt by observation and

practice, and that systematic attempts should be made to lay down definite principles for the information and guidance of head-masters and parents as well as of the responsible superintendents of the boys' health. In the first place, every school should be provided with a medical attendant appointed by the head-master, working under his direction, responsible to him and to him only, but with the right of appeal to the governing body in case of capricious dismissal. It is just possible, although not probable, that, as occasionally happens in private practice, sanitary recommendations may clash with the self-interests of those to whom they are made, or differences of opinion may arise on points of professional ethics or even on actual practice. Under these circumstances the assumption is not an extravagant one that an attempt may be made to cut the Gordian knot of controversy by the sacrifice of the opponent, and that the future career of the doctor may be seriously compromised by removal from his post. Such things have occasionally happened within the professional ranks of education, and may at any time happen again; but, inconvenient although it may be for an assistant-master to lose his appointment, he will seldom fail in obtaining employment elsewhere, and therefore stands on a different basis from the

medical man, whose credit must necessarily suffer in the neighbourhood in which he lives, and who loses a considerable and perhaps essential part of his income by dismissal. Without in any way wishing to impair the authority of the head-master, or to insinuate a doubt of the almost invariably kind and sympathetic treatment of those under his charge, we are compelled to admit the occasional infirmity of human nature and the possibility of injustice being done, and it will, therefore, be right to allow the doctor an appeal to the governing body in case of what may appear to him to be unnecessary or insufficiently explained removal from his post.

The question will arise whether the medical attendant should be allowed to take private practice, and on the whole it seems better that he should do so, as the wider scope he can obtain for the exercise and consequent improvement of his professional powers, the better for those under his care; and it is also evident that the emoluments of the position cannot otherwise be made sufficient to tempt the best men away from the inducements of a more ambitious career. The only alternative is to place him in the same position as the masters, let him teach some scientific subject, and share the profits of housekeeping; and in the event of the proper sort

of man being procurable, the arrangement might work well enough. But under such a plan the danger would arise of the actual professional work being done hurriedly or in a routine or perfunctory manner, and occupying a second place in his mind to the chemistry or biology or botany which must inevitably exert their irresistible and absorbing powers of fascination. So it will be far better to let the doctor remain a doctor pure and simple, thoroughly devoted to his strictly medical duties, and kept up to the mark of modern progress and science by entering into the wholesome field of competition for the loaves and fishes of private practice with his professional brethren around. It is hardly necessary to exhort him to keep up an immaculate position, to charge good fees, to encourage friendly and genial social relations with his fellows, and to aim at being the leading man of the district, called into counsel not only in matters of grave practical difficulty, but in the settlement of those nice questions of ethics and of professional morality which occasionally arise in all medical coteries, and which a little tact and common-sense shrewdness will often effectually remove.

Dr. Butler, in an amusing passage in a recent address, has given a Utopian sketch of the ideal

teacher, and, following his example, I might place on paper a companion study of the type of doctor to be sought for to take charge of our large schools. But without any incursion into the regions of romance, all will agree on a few attainable qualifications, without some, at all events, of which success will hardly be secured. In the first place he must be a gentleman, as he has to deal largely with gentlemen, and it is well, if possible, that he should himself have passed through the curriculum of public school and University, so as to bring him into sympathetic relations with those among whom his lot in life is to be passed, and who have themselves either traversed or are engaged in traversing those high roads to culture. A practical knowledge of the outs and ins of school life and a moderate proficiency in athletics will be of great service in helping him to gain the confidence of the boys, and the possession of a University degree and a certain familiarity with the sacred reminiscences of Oxford and Cambridge will at once secure a good reception from the masters, and remove that tinge of not always concealed contempt with which University men look on those who have not been fortunate enough to conduct their educational training by the banks of the Isis or the Cam. Tact, temper, and some knowledge of the world

come next, and are all essential in consideration of the peculiar and not always absolutely harmonious elements with which he has to deal, consisting as they do of the head-master, house-masters, boys, and parents. The peculiarity of his relations with the various masters who compose the educational staff consists in the demands which they very naturally make for absolute precision in diagnosis and prognosis, and which, of course, are quite incompatible with the uncertainties of medical practice. The training of their own minds in the precise study of words and the definite niceties of language, with perhaps a certain smattering of science, have led them to believe that the problems which the doctor has to solve are as capable of ready demonstration as those of Colenso or of Euclid, and that an opinion can as surely be given on a doubtful case as on the interpretation of a passage in Horace or Homer. It is of course most annoying that the official whose duty it is to advise on matters medical should hesitate to give a decided opinion at the critical time when decision seems all-important, and that he should be unable to pronounce at first sight on the nature of a suspicious rash or the probable cause of a feverish attack. Visions of unchecked epidemics pass before the head-master's mind's eye, expense and worry, the

breaking up of his school, the comments of the press, the annoyance of parents, the injury to the boys themselves, and yet he cannot persuade the doctor to say absolutely yea or nay as to whether the dreaded eruption is scarlet fever or nettle-rash.

We can fully sympathise with his annoyance, and most especially when he has to deal with a young practitioner fresh from hospital work, probably unfamiliar with the earliest stages of disease, and perhaps deficient in that practical tact and self-reliance which experience can alone confer. The ordinary education of the English medical student is singularly ill adapted to supply him with the kind of knowledge which is necessary for general practice, and which he will afterwards have to pick up for himself, perhaps at the expense of his patients. He has seen a large number of complicated disorders treated in the wards, and from among the chronic coughs and rheumatisms and dyspepsias which crowd the out-patient room he has been able to pick a few cases of disease in their acute stage. But he may have taken his qualifications and acquired prizes and medals innumerable without having seen measles or scarlet fever or smallpox at the time when diagnosis is difficult, or been called upon to give an opinion on some complicated and indefinite combination of

symptoms undescribed in his text-books. In Edinburgh there is an excellent arrangement, by which the student is obliged to attend dispensary practice, and to visit under the eye of the superintending physician or surgeon all sorts of cases at their own homes. In this way he is brought directly face to face with many of the more pressing difficulties of his future career, and begins his independent professional life with an amount of confidence which will in time aid him to acquire the confidence of his patients.

Of course we all know that it is sometimes impossible to give a decided opinion in the very earliest stages of a case as to what it really is, and a little explanation will make this clear, but nine times out of ten the experienced practitioner should be perfectly decided in his expression of belief, and should state his views with that wholesome tinge of dogmatism which carries conviction to the mind of the hearer. He will soon learn to be familiar with all the probable varieties of eruption, will know when a hot skin and headache and bounding pulse are about to usher in acute disease, or when they merely indicate a passing wave of feverish disturbance, and will eventually attain to a sort of intuitive faculty of diagnosis which he is probably quite un-

able to explain or reduce to any specific formula. He will doubtless make mistakes from time to time, but he should be careful that no evil consequences can follow his errors, and he may be certain of this, that his own credit will suffer far less from undetected symptoms, which were probably outside the reach of recognition at the time, than from a perpetual attitude of timid uncertainty and cautious vacillation which must rapidly destroy all confidence in his professional powers.

This, however, my own experience enables me to promise him, that when the head-master and his educational staff have satisfied themselves of his skill and knowledge, they will give him their confidence freely and unreservedly, will implicitly rely on his opinion, will consult him on all occasions, and will make everything go smoothly and pleasantly, both in professional and social life.

His relations with the parents of the boys will not always be quite so satisfactory. The best arrangement undoubtedly is that all correspondence on health matters should be directly conducted by the house-masters, and that the doctor's opinion on any particular case should therefore, except under exceptional circumstances, be officially communicated to them. This of course will save endless worry and

bother, but in any case of serious, and not unfrequently of trivial illness, representatives of the patient's family will appear on the scene, and being perfectly idle for the time being, and perhaps gifted with an anxious and impulsive temperament, they will call for the exercise of a good deal of tact and temper on the doctor's part. They will almost certainly find fault in some way or other with the treatment pursued, with the arrangement of the bed, of the food, of the lack or excess of air, with the nursing, perhaps even with the drugs themselves, insisting that the prescription of the family attendant shall be carried out, or that the case shall be conducted according to some superficial smattering of knowledge which they themselves may have acquired. The higher we penetrate into the sacred circle of what modern jargon calls 'society,' the greater will be the difficulty, as we will find that aristocrats and their parasites fall an easy prey to quacks of all kinds, and are perpetually trying to force their friends into their own belief in the special skill of homœopathists and bone-setters and irregular practitioners of strangely assorted variety. The school doctor, however, will have little difficulty in holding his own on all occasions if he acts with sufficient firmness at first, and, putting his foot firmly down,

refuses to budge one inch from the position which he has taken up. When he has definitely made up his mind on the line of treatment to be pursued, and made his arrangements accordingly, he must absolutely refuse to accept any suggestions from outside or to alter any detail of his plan save on the suggestion of a superior professional authority to himself, and when he feels in the least doubt or difficulty, he should have no hesitation in proposing a consultation with the best man to be procured. In this way he will succeed in attracting or in retaining the good will and the respect of all.

There can be no difficulty in getting on comfortably and harmoniously with the boys if the right line is adopted at once on taking up his school duties. Boys are good judges of character, they very quickly find out who they should respect, or whose authority they may safely defy, and in the case of the doctor they will not be long in making up their minds as to the reality and extent of his professional pretensions. Early impressions are here of the highest importance, and the management of his position during the first term of his appointment may make or mar his future career. Schools are much swayed by tradition, the character and status of the masters are handed down with inexorable fidelity, and are

well known to boys before they are actually enrolled, and in a rough way these impressions are not untruthful or unfair. The doctor will either be known as a humbug whose opinion is treated with scant ceremony, or he will be respected and trusted and made the sworn friend and adviser of the boys in their troubles, and it will be his own fault if the possession of knowledge and tact and prudence and some experience of the world does not place him in that enviable position. It is of course quite inevitable as an outcome of human nature that attempts should be made at first to 'bosh' him, or take him in with sham ailments. Perhaps he has carefully prepared himself for this in advance by a study of those remarkable works on feigned diseases which the experience of old army surgeons put together, and which display a perverted exercise of ingenuity truly marvellous to contemplate. He may look with suspicion on every headache and pain in the back, and snuff imposture in the air where symptoms seem to be entirely subjective. Such an attitude of suspicion will only defeat its own end, and cause him some day to make some egregious mistake which may be productive of serious consequences. It is far better to be occasionally deceived than to brand one real sufferer with the offensive imputation of

imposture, and I feel convinced that such attempts will rarely be made if their real moral significance is pointed out. When a boy apparently in excellent health presents himself on a whole-school-day morning with a catalogue of symptoms undetectable by the eye or the ear, suspicion should be hinted, and an appeal made to his honour as to whether some exaggeration is not present, and whether he is not really able to do his work. If he persists in his statement, accept it at once as pledged to its accuracy on the strength of his truthfulness and manly school-boy integrity and gentlemanly feeling, and then send him to meditate in the quiet and seclusion of the sick-house, with his mental vision cleared by low diet and his reflective powers encouraged by solitude. If his symptoms are real we have not hurt his feelings by doubting his word, and we have adopted thoroughly rational treatment. If, on the other hand, an attempt has been made at deliberate deception, he will not have taken much by his move, he will have lost caste in his own estimation by the honourable way in which he has been treated, and even if his pride will not allow him to make a clean breast of it on this occasion, it is pretty certain that he will not be likely so to offend again.

In addition to his more strictly medical duties,

the doctor must of course be the sanitary adviser and scientific guide of the school, he must inspect the houses from time to time to see that drainage and ventilation and water supply are in good order, and that no defects of original construction, or from faulty management, are exerting any bad influence on the health of those under his charge. It will be his duty to ferret out the origin of any stray case of typhoid or diphtheria, to ascertain when epidemics are prevalent in the neighbourhood and take precautions accordingly. He must be thoroughly informed on every detail of modern progress in preventive medicine, and be prepared to impart his knowledge to others. An occasional lecture on this and kindred topics of general interest will of course be appreciated in proportion to its value, and, without showing any obtrusive desire to be perpetually airing his knowledge, he must take care that it should be at all times available for use if required, and that it should be well up to date and trustworthy. His opinion will naturally be taken on questions connected with diet and clothing, probably on the extent and arrangement of work and play, and he should have definite and well-considered opinions on these and kindred topics.

It is most important that house-masters should

be encouraged to consult him about all ailments, however apparently trifling, which affect their inmates, for the experienced eye can often detect coming danger around symptoms which would hardly excite the attention of the uninstructed; and consultations may frequently and with great advantage take place concerning the health of boys—the master, from his intimate knowledge of their usual appearance, being readily able to detect any deviation from the ordinary standard of colour or expression, and an experienced housekeeper may often be of service in observing any incipient derangement of health. We should hardly be inclined to advise any regular or formal medical inspections; but the doctor should make it his duty to be much among the boys, watching and perhaps even sharing in their sports, and so far gaining their confidence and good will that they will readily come to him in all their little troubles. In this way he will very quickly see if anything is going wrong, if dulness or listlessness, or depression or unusual inattention at school hours, or deficient energy at play, shows that something is amiss which a timely word or a timely dose may put right.

It is only a reasonable precaution to insist that boys on their return after the holidays should bring

a certificate to the effect that they have been in good health, or, if they have been ill, what the nature of their illness has been. The doctor can then make a careful inspection, and will now and then discover that some one in the full activity of desquamation has been sent back to mix with the rest of the school and prove the starting-point for a troublesome epidemic. It may charitably be supposed that, the attack being a mild one, passed over unobserved, but it is to be feared that parents now and then deliberately send their children away to save trouble at home and prevent the spread of infection. We recently read of a case in which a boy was taken several times to the hairdresser's to have the scurf following scarlet fever thoroughly brushed out of his hair, and the ignorance and lax morality prevailing on this subject sufficiently explain the great prevalence of this troublesome and dangerous disease.

It will be greatly to the advantage of the school doctor, as well as for those under his care, that some kind of simple health registration should be carried out, and we append a form constructed after the pattern of the medical history sheets used in the army, giving headings under which the height, chest measurement, pulse and respiration rates at various ages may be recorded, and the illnesses of

childhood briefly inserted. When the boy comes to school, his history sheet should be taken in charge by the doctor, who thus finds out, on better evidence than mere hearsay, what he has already passed through, and what may be expected in the future. On it will of course be inscribed all accidents and school illnesses, and when he goes home for good a most valuable record will accompany him for the benefit of his family and of those medical men who may have to treat him in after life.

Dr. Crichton Browne, in his brilliant article in 'The Book of Health' on 'Education and the Nervous System,' makes a plea for a much wider and more comprehensive scheme of registration, and advises twenty headings, under which special points of information might be tabulated with much scientific advantage. He tells us very truly that 'the registers kept at various schools throughout the country would speedily become mines of wealth to statisticians and anthropologists, and the collocation and comparison of the facts contained in them would help to the solution of many problems of national importance.' No doubt this would be so, and if all medical men were possessed of Dr. Browne's industry and power of work, information of this kind would accumulate with gratifying rapidity; but we much fear that the

distractions and anxieties of general practice will almost of necessity preclude the adoption of any very elaborate plan of registration. Not only will a good deal of time be consumed in filling them up, but unless order and precision and extreme accuracy are strictly attended to, the results to be derived from their study will be fallacious and misleading, and the labour of their preparation will therefore be thrown away. But whilst we are not inclined to recommend the compulsory adoption by the school doctor of anything more than the simple formulæ given below, we strongly advise a careful study of Dr. Browne's remarks and the following out of his plan whenever leisure or opportunity permit.

Name	Age	Weight	Chest Measurement
Pulse Rate	Respiration	General Physical Development	
Vaccination Marks	Family History		

Previous Medical History

Medical Register of observed illness and Treatment

It is best that the school doctor should be paid by head money and not by fees. If his endowments depend on remuneration for individual attendances, he may some day encounter the insinuation that excessive attention to any particular case has been stimulated by pecuniary motives ; whereas the other plan will enable him to gratify his scientific zeal or to show his active sympathy and interest to his heart's content. House-masters will be able to consult him on all emergencies ; boys can come to him whenever they like ; housekeepers will not try to economise in the interests of their employers by domestic medication, and he will be able to stop many an epidemic by early and prompt action. It must of course be left for individuals to arrange the most convenient way of getting through their work, but it seems difficult to devise a better plan than that which I used to adopt at Rugby, and which consisted in going round the various houses in the

early morning, and seeing those boys who were unable to go into school. If I were not wanted at all, a signal was hung out of the window, but usually some little question would arise every day, and a report was then sent in to the house-master.

Some schools adopt the system of sick-rooms in the houses, where trivial cases may remain until they become either better or worse, but I think it is best to have no half-measures of the kind, but to remove any boy who is so much out of sorts as to be unfit for work at once to the sick-house. This will encourage the belief that the hospital, instead of being a grim and solemn portal through which only those who are seriously ill may pass, is a quiet and cool retreat for those who are temporarily unable to bear the heat and burden of the day. If the case is a slight one, rest and repose will quickly put it right, and if it is to be severe or infectious, then the perils of removal have been early got over and the best means adopted by isolation of preventing contagion from assuming an epidemic form.

The hospital itself should be placed at some little distance from the school ; it should be large enough to hold thirty beds, allowing 1,000 cubic feet of air for ordinary and 2,000 for fever cases to each patient, and should be divided into small rooms or

wards. It is quite essential that infectious cases should be treated in a detached wing or dependence, for whatever amount of care is used in isolation the attempt to prevent contagion from spreading to other patients under the same roof must eventually break down. Contact with nurses, or chance mingling of clothes in the laundry, milk or water, even a book or a flower or the air itself may convey the subtle germ and bid defiance to all our precautions. We must therefore insist upon a separate building where we can remove all our suspicious cases, and which can be jealously guarded against all chance visitors. The patients must be kept there until all infection has subsided; the rooms occupied by them should then be thoroughly cleansed and purified, and all clothes disinfected by baking by means of Nelson's well-known apparatus, or by being placed in boiling water, to every gallon of which 2 ozs. of the commercial chloride of lime, or $\frac{1}{2}$ oz. of sulphate of zinc, or $\frac{1}{2}$ fl. oz. of chloride of zinc is added.

Although the best means of purification are well known, there can be no harm in once more enumerating the most efficient means, which are thus conveniently summed up by Parkes ('Practical Hygiene,' p. 507):—

'In addition to thorough cleansing of all woodwork

with soft soap and water, to which a little carbolic acid has been added (one pint of the common liquid to three or four gallons of water), and the removal and washing of all fabrics which can be removed, and brushing of the walls, the room should be fumigated for three hours with the fumes of either sulphurous or nitrous acid. Both of these are believed to be superior to chlorine, especially in smallpox. All doors and windows and the chimney being closed, and curtains taken down, sulphur is put in a metallic dish, a little alcohol is poured on it, and it is lighted. The proportions should be one pound of sulphur for every thousand cubic feet of space, and in a long room it is best to have the sulphur in two or more places. After three hours the doors and windows should be opened and kept open for twenty-four or thirty-six hours.

The hospital of course should be constructed according to the most approved sanitary rules; it should be cool and airy, and bright and cheerful, and should contain one or more pleasantly furnished rooms where convalescents may dine and amuse themselves with books and games. It should be provided with a garden, and if possible also a field where gentle exercise may be taken, and when full convalescence is reached it will be found an excellent plan to draft the patients for a short time to some

neighbouring farm house where they can pick up health and strength before returning to school. This will be found to effect a less thorough dislocation of school work than the return of the boy to a probably much longer period of idleness at home.

Within the hospital the medical officer must reign supreme, all arrangements must absolutely be in his hands; he must decide all points connected with diet and regimen, with visitors, with discipline, with the length of treatment, with the resumption of work, and from him in this his stronghold there must be no appeal.

His principal *aide-de-camp* will be the matron, who must combine as far as practicable the *suaviter in modo* with the *fortiter in re*, and probably two nurses, one for night and the other for day work, will be a sufficient staff at ordinary times. And when acute cases make special demands on care and attention, or when epidemics render isolation necessary, he will be able in most cases to recruit his forces locally, or, if the worst comes to the worst, to obtain skilled assistance from town.

I have already expressed my opinion of the desirability of the medical inspection of Board Schools. Medical officers of health may be held responsible for the sanitary condition of the buildings in their

districts, but there is not much evidence to show that they interfere with educational hygiene save at very rare intervals; and a professional adviser reporting from time to time to the School Board would be a great service, and need not necessarily involve any heavy expenditure. Since 1869 this principle has been recognised in Paris, and 114 inspectors have been doing duty at an annual salary of 24*l.*, beside which the 60*l.* allowed at Lyons looks handsomely liberal, and they report on the health of the scholars twice a week. If these inspectors were also the local officers of health, their usefulness would be doubled, for after noting the absence of particular children from school, they could follow them home, and discover the reason of their non-appearance, laying down rules in the case of infectious disorders for the isolation of cases, their removal to hospital, and the quarantine of other members of the family.

VI.

SCHOOL DISEASES.

THE first query which naturally suggests itself is whether there really are any school diseases—that is to say, diseases directly caused by the circumstances necessarily attending school life. To this some Continental authorities give no uncertain reply, and enumerate a variety of affections which they consider due to the educational systems now in vogue, and which, if the connection between cause and effect be established, are sufficiently numerous and serious to deserve most careful examination. For instance, Guillaume tells us that at the municipal college in Neufchâtel, out of 350 boys and 381 girls, making a total of 731, he found well-marked ‘goitre scolaire’ in 169 of the former and 245 of the latter; and he endeavours to prove that this is caused by derangement of the circulation in the neck following a faulty position of the head during the lesson hours. Judging from all that I have been able, however, to read and hear, his experience is fortunately unique, and the

rational explanation must be that, even granting some element of causation according to his views, the predisposing cause must be in some local and climatic peculiarity of the town of Neuchâtel. Educational work seems to be carried on there under circumstances of peculiar difficulty, for the same author notes the frequent occurrence of digestive derangement from pressure of the false ribs on the abdominal organs, headaches in 296 out of the entire number of pupils, and 155 cases of bleeding at the nose.

In this country we seldom meet with these unhappy results, and any school system which could be held responsible for so much discomfort and even danger would be unhesitatingly condemned by the voice of public opinion. Short sight and spinal curvature, which have been most exhaustively treated by French and German authorities, are undoubtedly produced by defective arrangement of light and seats, and there are various interesting points connected with the specialities of diagnosis and prognosis in the diseases of youth to which we shall have occasion to refer, and we will endeavour to show in how far the ordinary conditions of school life modify or alter the symptoms of the varied affections which are most usually met with at this period of a child's career.

With the first dentition the school doctor has, of course, nothing to do, but indirectly it is important for him to know whether it was stormy or quiet, because the seeds are then often sown of some of the chronic nervous disorders of later years, and an impulse given to various hereditary predispositions.

From two to six we have to look out for tubercular meningitis, and it is very important that in children with a strongly-developed consumptive tendency the mind should be allowed to lie almost entirely fallow during this dangerous period. Two-thirds of the deaths from scarlet fever take place under the age of five, but up to ten it is still common, and indeed it is not too much to say that in an unprotected subject infection is pretty sure to follow effective exposure at any period of life.

From seven to fourteen includes the eruption of the second teeth, which is seldom a troublesome process, and within this period the most frequently prevailing diseases are rheumatism, chorea, epilepsy, typhoid, and the exanthemata. Puberty now takes place, and must be carefully watched, more especially in girls, who often become pale and languid and disordered in nervous function in a perplexing variety of ways. Hæmorrhages from various organs often take place, headache is a frequent symptom,

and, as growth upwards is very rapidly going on, debility both of mind and of body is not uncommonly observed, and education must be conducted with caution.

A very careful study must be made of hereditary tendencies, the most potent of which as affecting school life are struma, tuberculosis, and nervous disorders. The first of these shows itself in the form of chronic eye and skin disease and swollen glands, the second makes its unwelcome appearance as affecting either the intestines, the brain, or the lungs, whilst the third may explode at various times, and under a variety of conditions.

A strongly-developed neurotic tendency requires careful watching, as different predisposing causes may bring about chorea, epilepsy, hysteria, migraine, and other of those painful and intractable nerve storms so well known and so justly dreaded by medical men.

In briefly considering some of the most common affections of school life, we shall neither attempt a systematic arrangement nor a description of their forms and varieties. This is not a book on the practice of medicine, and all we shall attempt to do is to give our own experience of what the school doctor may reasonably expect to encounter, and try

to show what deviations are met with from the typical course of symptoms observed in the adult. And without overloading my pages with quotations or references to classical authority, I have been at pains to derive confirmation, when necessary, of my own views from those whose great experience justly entitles theirs to respect.

Of all the pests of school life, the exanthemata must be placed first and foremost. So subtle and persistent is their infection, and so mysterious is the way in which they suddenly appear in the midst of a previously healthy community, that not even the greatest care can prevent an occasional case cropping up under conditions which may defy all our attempts at explanation. The theory of spontaneous generation has been started to meet these difficulties ; and Dr. A. Carpenter tells us that scarlet fever may be generated in the neighbourhood of slaughter-houses ; other authorities ascribe occasional outbreaks of measles to the presence of damp or decaying straw ; and Miss Nightingale says in her ' Notes on Nursing ' that she has seen with her own eyes, and smelt with her own nose, small-pox gradually developed in crowded hospital wards. For my own part I have not been convinced by the evidence brought forward in support of these views, and until something more

tangible is forthcoming, I will continue to believe, and will advise my readers to share my belief, that direct infection or contagion is invariably the cause of this class of diseases. If the occurrence of an isolated case of scarlet fever induces us to set our houses in order by inspecting the drains and overhauling every sanitary arrangement, good will undoubtedly come out of evil, but, on the other hand, anything which weakens our faith in specific communicability of the infective material would be a scientific misfortune. The highest aim of preventive medicine should be to stamp as many diseases out of existence as we can, and the only chance of reaching this desirable end is by early detection and registration, and prompt and complete isolation. History teaches us that savage tribes are free from infectious disorders until they get them from their neighbours. The American Indians receive our small-pox as an instalment of civilisation, and the Faroe Islanders were decimated by the previously unheard-of measles planted among them by the unlucky arrival of a single case.

Many people have unfortunately got the notion into their heads that every child must take scarlet fever, or measles, or chicken-pox, or whooping cough as a matter of course, that the sooner the attack is

got over the better, and that on the whole it is not a bad plan to expose our children to infection under favourable circumstances, in order to prevent their being seized at some less convenient time. How foolish this is perhaps only a medical man can fully realise. He knows that it is impossible to predict how any individual case may turn out, that even in the course of the mildest of epidemics idiosyncrasy or accidental circumstances may run the patient off the rails of safety into danger, and that the lightest of possible attacks may be followed by disabling and even fatal sequelæ.

There is no conceivable advantage to be gained by having any disease of any sort or kind. We can never tell the ultimate result of introducing a morbid germ into our constitution, and our great aim and object throughout life ought to be to avoid the slightest deviation from physiological integrity. All this may seem the most elementary of platitudes, but the warning is distinctly needed that parents should absolutely give up the fatalistic doctrine that their children must of necessity catch this or that disease before they grow up, and that they should learn to look upon anything of the kind as a sheer misfortune without any surrounding gleams of consolation. And when this is thoroughly recognised,

when we have a well-devised scheme for notification and registration made compulsory, and when hospitals for infectious cases are multiplied in every populous centre, then and not till then will we be within measurable distance of the extinction of a number of fatal and inconvenient disorders which have no right ever to make their unwelcome appearance within a civilised community.

Scarlet fever is responsible not only for over 20,000 deaths a year, but for various troublesome sequelæ, and its contagious influence is so prolonged and subtle that the appearance even of an isolated case is regarded with very natural dismay. Early detection is here of the highest importance, and the doctor will not only gain personal credit, but distinctly benefit the general community by recognising the disease in its earliest stages and preventing further spread by rigidly-enforced isolation. But this is not an easy thing to do. Nothing can be simpler than to pronounce on the nature of a well-marked case; but when things are very indefinite, when no eruption has appeared, and when the symptoms merely indicate that general malaise and constitutional discomfort common to all acute diseases, even the most experienced practitioner may be puzzled, and compelled to be very guarded in his diagnosis.

From three to five days of incubation is the rule, and although the child may seem languid and out of sorts, there is nothing definite to put the doctor on his guard, unless other cases have occurred in the house or the neighbourhood, and the patient is not protected by a previous attack. During this time, in spite of some attempts to prove the contrary, infection is dormant, and there is nothing to be conveyed from the patient to those by whom he is surrounded.

The actual beginning of the disease varies somewhat according to the nature of the attack. The dose of the poison may be so heavy that the nervous system is crushed and overborne, and the patient dies in coma or convulsion before the appearance of eruption or of any local symptom. Such cases are fortunately rare, although a succession of fits is not an uncommon precursor in young children of an attack which may belie its stormy introduction by passing through its subsequent stages without difficulty or danger.

The illness generally comes on somewhat abruptly. Sir William Jenner records a case in which a patient said to him, 'I was quite well when I went downstairs to fetch some water; crossing the yard I felt my throat was sore;' and a boy told me that while

at tea he felt all at once as though a piece of bread had stuck in his throat; next morning he grew sick and faint, and the eruption appeared. Some patients complain of feeling chilly and sore all over, as though they had taken cold, and one in particular experienced so much pain and stiffness in his legs that he had some difficulty in going upstairs. This exactly accords with my own recollection of the early symptoms, for whilst coming home from the Edinburgh University one afternoon I felt my legs so heavy and aching that I could hardly finish my walk, and on arrival was obliged to go at once to bed. Next day the characteristic rash appeared.

Vomiting is also a frequent symptom, and occurred in 90 out of 117 cases reported by Lewis Smith of New York within the first twelve or eighteen hours.

Frontal headache may generally be noted, and the temperature is elevated above 100° , and the higher the elevation on this early day of illness the greater the probability that we have to deal with these acute specific diseases' (Jenner).

The lips are red and the tongue is large and flabby, the tip and edges being red, but the body of the organ covered with a thin white fur through which enlarged papillæ appear with striking effect; a few days later the fur disappears, and the well-

known and very characteristic strawberry appearance may be observed.

The throat is at first covered with punctiform red spots, finally coalescing into an erythematous blush, the palate is studded with granular prominences, and the tonsils are enlarged and dabbed over with whitish flakes of lymph, which, when once seen, leave no doubt as to the character of the disease.

The glands at the angle of the jaw are usually swollen and tender.

The eruption begins on the second day, or late on the evening of the first, and earliest appears about the root of the neck or top of the chest. It spreads downwards over the arms and trunk and up to the face, and finally passes out by the toes, as Jenner puts it.

It is at first very decidedly dotted or punctiform, but soon runs into one wide and uniform sheet of lobster-like redness, disappearing absolutely on pressure, and frequently mixed with a few petechiæ or an abundant crop of sudamina, neither of which have any prognostic significance.

If we are in doubt about the rash, or if it is so slight as to be barely noticeable, put the patient at once to bed, and come back to see him again in a few hours, when we will probably find that warmth has stimulated

the skin, and that all our difficulties are removed by the appearance of a copious eruption.

The eruption has usually disappeared at the end of a week, although now and then it has not faded for nine, ten, or, as Sir William Jenner tells us, even for seventeen or eighteen days. Such deviations from the general rule, however, are very exceptional, and as the rash fades away from the toes at the end of its appointed time, we may observe a whitish efflorescence beginning on the neck, the upper part of the arms, and the roots of the nails, indicating that separation of the cuticle which is commonly known as desquamation. Sometimes copious and complete, it may be almost entirely absent, or amount to little more than a branny dust, and again, it may relapse with an irritating persistence when we fancied our patient entirely convalescent and fit to leave hospital. The thoroughness of the skinning process depends principally on the nature of the preceding eruption, for if this has been copious, the patient will cast off his epidermis in large flakes, and perhaps furnish some of those pretty complete moulds of the hand or feet which we occasionally see in museums, whereas if the rash be trifling we may be unable to discover anything beyond a trifling shedding of the cuticle around the matrix of the nail, a diagnostic sign of much impor-

tance when we are puzzled as to what the nature of an illness may have been. A child has perhaps been in a house with others who have passed through scarlet fever, and although it may have been languid or out of sorts for a day or two, there has been, according to the parents, no rash or sore throat, and it has not been kept in the house or subjected to any medical treatment. It comes back to school as usual at the beginning of term, or perhaps presents itself in the hospital out-patient room, and if we find a little peeling at the root of the nails, we may feel quite sure that it has had a slight attack of the disease.

Another proof of great value at a later date is the transverse furrow sometimes appearing on the nails after acute illness, and to which attention has been more specially directed by Dr. Wilks. Although not peculiar to scarlet fever, this is the most common cause, and as the nail takes five months to complete its entire growth, the position of the furrow will enable us to guess roughly at the date of the attack.

Peeling is usually over in from three to six weeks, and it may be helped on its way and the infectious dust prevented from scattering its baneful influence widely around, by anointing the skin with carbolated olive oil, and by giving the patient three or four hot

baths. The kidney sympathises meanwhile with what is going on, and free desquamation of the renal epithelium takes place, the urine being loaded with cells and casts, and usually a trace of albumen may be detected towards the third week. About the period of convalescence, various sequelæ may be noted.

Rheumatic symptoms, varying from mere vague and shifting pains up to the acute inflammation of various joints, are by no means rare, and heart mischief too often follows, and nothing is better known in medical practice than nephritis, which may stop at slight congestion or run on into incurable Bright's disease. When our patient looks pale and puffy about the eyes, when the urine is scanty and smoky in colour, then we will invariably find that it contains blood and a large quantity of epithelial casts, indicating engorgement of the malphigian bodies, blocking up of the urinary tubules, and partial suppression of the secretion.

This does not profess to be a book on the practice of medicine, and it is therefore unnecessary for us to say anything systematic about treatment, save to record our own conviction that we cannot hope to do anything to alter in any essential degree the nature of the attack, or do more than aid nature and look out for complications. The vain search after specifics

for this and allied diseases has now been given up in despair, and we now fully admit that we cannot treat the human body like a combination of elements in a crucible or retort, and that exclusively chemical theories of the nature of morbid processes are too often rudely shattered by clinical experience. It is a safe precaution to keep every case of scarlet fever in bed for at least three weeks, and confined to the house for eight or ten more. A chill during peeling is most dangerous, and may cause acute kidney disease, or pleurisy, or pericarditis, which may very rapidly prove fatal, and we often see the most dangerous sequelæ follow quite a slight attack where proper care has not been used.

Oiling and bathing, as we have already said, are useful during the desquamation period, and when symptoms arise denoting renal congestion, we must try to induce the skin to act by cold packing and hot-air baths, and sluice out the tubules by copious draughts of water, in which, perhaps, a small dose of some mild saline diuretic like bitartrate of potash is dissolved.

The school doctor must be prepared to answer certain definite questions put to him by parents and masters, and the first of these will be, 'Is this going to be a bad case?' If the rash is well out, the tem-

perature not over 104° , if enlargement of the cervical glands does not indicate severe throat mischief, and if the epidemic generally has not been a severe one, we may promise a favourable result, if great care be taken to avoid exposure to cold and errors of diet. And then, again, he will be asked how long will it be before the patient can safely return to school, and here he will do well to curb the natural impatience of the parent, and insist on from six to eight weeks' absence according to the nature of the case. Of course, if the symptoms have been very slight, if desquamation is soon over and the strength but little impaired, the boy may join his companions at an earlier date, but we will nearly always find a good deal of nervous prostration. He will look pale and pulled down and unfit for work, his memory is impaired, he is easily worn out, and the urine at this time generally contains a large excess of phosphates, showing that a good deal of waste is going on. So that it is better to let him lie fallow for a considerable time, and a further good excuse is afforded in the very obstinate way in which portions of hard cuticle adhere to the heel. As long as any portion of practically dead skin remains attached in this way, the patient is still dangerous to others, and I have seen from two. to nearly three months elapse before this

cause of danger was finally removed. It is very convenient for a large public school to be provided with a sanitarium in the country, where convalescents may pass through a period of quarantine previous to going home.

Although a well-developed case of scarlet fever can hardly be mistaken by a medical man for anything else, doubt may arise in some of those miniature types where some of the more essential symptoms are conspicuous by their absence. Thus we are told that the disease may pass through all its stages without either eruption or sore throat, but this is highly improbable, and the true explanation probably is that both were so slight and so evanescent as to be unobserved by the patient or his friends.

When a case of scarlet fever occurs in a house, it may be absolutely impossible to remove the patient, and we must trust to isolation carried out with the most rigid precaution. Select a room in the top flat, as infection does not seem to spread readily downwards, and divest it as far as possible of carpets, curtains, and all superfluous articles of furniture. A sheet thoroughly soaked in a solution of Condy's fluid must be hung in front of the door, the nurse must be debarred from every communication with others, and clothes from the sick-room must be kept thoroughly

apart, and baked before they are washed. As previously explained, the patient's skin must be anointed with olive oil containing a little camphor or carbolic acid, all discharges must be received in vessels containing some antiseptic agent, and he must be kept in quarantine until the process of desquamation is thoroughly completed.

In order to disinfect the room we must wash the walls and floor thoroughly with carbolic soap, white-wash the roof, and burn sulphur for three hours, every crevice being closed up, and a condition of atmosphere temporarily established which would be absolutely irrespirable by any living being.

The best mode of using dry heat for disinfecting purposes is by means of the 'Nottingham self-regulating apparatus,' but that invented by Nelson of Leeds is cheaper and more convenient, and is highly recommended by Dr. Dukes, from whose excellent article we quote the following remarks:— 'The heat is raised until the thermometer registers a minimum of 140° F. outside—inside the heat being about 60° F. above this, or 200° F.—and it may range from 200° F. to 250° F. inside without damage to articles of clothing or bedding. It takes about twenty minutes to get thoroughly heated for use; and in this chamber every soiled and infected article can be

rendered free from infection within a reasonable time—from twenty to sixty minutes, varying according to its size, material, and thickness. I have never known a case of infection occur through imperfect or ineffectual disinfection by this hot-air process. Thus mattresses, pillows, &c. take about three-quarters of an hour to an hour to become thoroughly purified, and every mattress that is ever required for a second case, even of the same infectious illness, should be thus purified and rendered free from infection before being used again.’¹

A very natural query, and one which is sure to be made, is, Where did the patient pick up the infection? and the answer to this, always difficult, will frequently be impossible. We have already expressed our belief that scarlet fever cannot be bred out of mere filth and sanitary negligence, but that the specific infective agent must come into some kind of contact with the body before it can reproduce the disease; and when we consider that every minute particle of shed cuticle is fully armed with contagious properties, and that a large number of cases of the disease occur every year, many under circumstances most unfavourable for the adoption of any kind of preventive means, our only surprise must be that this number is not

¹ *Health in Schools.*

multiplied tenfold. The variety of insidious ways in which the poison may be communicated would of itself make an interesting treatise. Mr. Hart¹ has collected fifteen epidemics caused by milk, the laundry has occasionally been responsible for its spread, and books, letters, furniture, flowers have been noted in turn as the carriers of the contagion, which has occasionally eluded the most careful inquiry, as in the famous case in South Kensington in which a considerable number of the guests who had dined on a particular evening in a particular house were attacked with this disease. Careful investigation proved that the infection had undoubtedly been communicated in a wholesale way on that occasion, but Dr. Buchanan, who was charged with the duties of detective, and whose sagacity and knowledge are well known, was quite unable to track out the medium by which it had been conveyed. Although such mysterious events will undoubtedly happen from time to time, they are not so likely to occur in school life, and patient inquiry in the neighbourhood and the search after the evidences of slight peeling on the hands or wrists of the boys will often enable us to track an epidemic home to its starting-point.

Measles is often looked upon as a necessary evil,

¹ *Transactions of the International Med. Congress*, 1881.

as one of the inevitable incidents of childhood, like teething or any other physiological process, and consequently but little care and precaution is sometimes taken to keep out of the way of infection. But there can be no more stupid error than this. A large number of cases occur every year, and not only do from five to ten thousand of these die in London alone, but the foundation of much chronic bad health is laid of which pure statistics can give no satisfactory record. Scrofula, consumption, various bronchial lung affections, and even heart disease often follow apparently trifling attacks, and we are therefore bound on all occasions to preach the doctrine that this is a serious disease, and must be persistently shunned.

Its onset is usually gradual, beginning, after an average incubation period of fourteen days, with languor, listlessness, want of appetite, and debility, which are apt to be looked upon as simple gastric derangements. The patient looks dull and heavy, is fretful, and sleeps badly, tossing about restlessly and wandering from time to time. There is generally a short, sharp, irritable cough, and a delicate conjunctival injection may be noted, beginning first on the lower lid, and associated with troublesome itching and watering. Sneezing and running at the

nose now become prominent symptoms, and it seems quite established that this secretion is contagious, and measles may therefore be considered as communicable to others before the eruption appears. On the fourth day dull red papules appear on the root of the nose and the forehead where it joins the hairy scalp, forming themselves eventually into a crescentic form, and spreading gradually over the body, disappearing about the third or fourth day. Some bronchial irritation often comes on about this time, and may constitute a formidable complication in the aged and those subject to chest affections.

Slight redness of the throat may usually be noted, with some enlargement of the cervical glands, and trifling desquamation usually follows the disappearance of the rash.

As a general rule, we may relieve the patient from quarantine in about a month. Measles may either run its course so mildly as hardly to deserve more than ordinary domestic care, it may prove rapidly fatal in its earliest stages, or it may cause the gravest anxiety and lay the foundation of much subsequent bad health; these differences being due partly to the age and constitution of the patient, and partly, so to speak, to the quality of the epidemic, which varies

according to some law which we are unable to comprehend, so that whilst at one time all our cases will do well, at another the best resources of the medical art will be powerless to save our patients. The sequelæ, or 'dregs,' as they are popularly called, are well known, consisting as they do of various eye affections, strumous swelling of glands, chronic skin eruptions, and tubercular and bronchial lung disorders; and as these not infrequently follow very slight attacks, we must impress on the nurse and parents the necessity of great care lest cold should be caught, or any bad sanitary influence be permitted to depress the powers of life.

Under the name of roseola, rubella, or rose-rash a form of disease has been described which is believed by some to be specific in nature, and by others is apparently confused with that rather mysterious disorder known as Rôtheln or German measles. I have had the opportunity of studying one or two epidemics, and am thoroughly convinced that we have merely to deal with a miniature or aberrant type of measles, as the following evidence will prove. Whilst nearly all the thirty cases which came under my observation on one occasion at Rugby School were most insignificant in character, a few ran gradually up to the type of true measles, which

was reached in absolute perfection in two instances.

These patients presented all the usual symptoms attendant on real measles in rather aggravated degree; there was copious eruption, high fever, and troublesome bronchial irritation, resulting, so far as careful inquiry could make out, from precisely the same infection which had barely disturbed the constitutional equanimity of the other victims of the epidemic. The usual routine was an outbreak of small pink spots, not elevated above the skin, and only partly disappearing on pressure, invariably appearing first on the chest and gradually fading by the third day. As a rule this was the only symptom; there was hardly any rise of temperature, and the rash was sometimes only discovered by chance when the boy was about to wash in the morning, and made him come in some alarm to see the doctor. Much opposition will usually have to be encountered when the proposal is made to isolate the patient, as he feels quite well and wishes to go about as usual; but we must be very firm on this point, and shut up the first case as resolutely as if it were scarlet fever or smallpox. For this is an excessively catching disorder, and I firmly believe that if I had not exercised measures of vigorous precau-

tion at Rugby every member of the school of five hundred boys would have been affected in turn. We hear a great deal in these days about German measles, and it is quite evident to my mind that what is usually so called is merely this mild rubella, which need seldom cause any anxiety. The specific disorder described by Dr. Murchison, and which is according to him a true hybrid, consisting of a compound of the eruption of measles with the scarlatinous throat, must be rare, as I have never met with anything of the kind, and I should be disposed to doubt its existence were it not for the unquestioned authority of the admirable observer whose loss medicine has not yet ceased to deplore. One or two morbid conditions not uncommon in early life, pretty closely imitate measles, and cause apprehension and alarm. A study of the concomitant symptoms, or rather of their absence, will lead us on the right track; and the same remark will apply to the varieties of nettle-rash, which will often give rise to suspicion. It is well known that certain irregularities of diet and certain peculiarities of constitution will give rise to these sudden and tempestuous skin irritations, which are not infrequently met with after indulgence in cucumbers, apples, strawberries, mushrooms, shell-fish, and other

articles of diet, which, although food to one, may be poison to another. In making our diagnosis we will generally find some evidence of digestive derangement, with characteristic wheals directing our attention to the real character of the disorder. In certain irritable constitutions the sting of a bee or wasp will give rise to great irritation, with constitutional disturbance, and I remember to have been on one occasion much puzzled by a measly-looking eruption on the hands and wrists which turned out to have been caused by the secretion of the hairs of a particular kind of caterpillar.

Mumps has some mysterious affinity with measles, frequently following in its train, and although seldom appearing during the actual existence of the rash, not uncommonly becoming developed during convalescence. At this time, then, our suspicions should invariably be aroused by any complaint of pain or stiffness about the jaw during eating, more especially if this is accompanied by tenderness and fulness in front of the ear, as this lobe of the parotid is invariably first attacked. When the disease begins more independently, we will find slight feverishness after an incubation of about eight days, and swelling, which, beginning as we have described, finally spreads down the neck, causing intense pain and a remarkable

and very characteristic disfigurement. One side is pretty sure to be attacked in succession to the other, the swelling somewhat slowly subsides, and on an average we may place the limit of the disease at fourteen days; but a good deal of debility follows, and its contagious properties, which are intense all through its course, cannot be considered as extinct for about three weeks. The patient must therefore be subjected to a rigid quarantine, and the liability to certain painful and even dangerous sequelæ or metastasis imposes upon us the duty of keeping him confined pretty closely to bed.

During an epidemic of mumps the school doctor must expect to be frequently consulted about numerous supposed cases, which may be divided into three groups:—

1. Swollen cervical glands from cold or constitutional causes. The diagnosis here is quite easy, as we can feel and isolate the enlarged and tender glands, which roll under the finger and are entirely confined to the neck.

2. An inflamed gland of larger size below the jaw, and forming the secondary bubo of an ulcerated sore throat. There can be no difficulty here, as we can readily detect the primary cause.

3. The puffy enlargement about the upper jaw

caused by a gumboil, and here some little doubt is almost excusable, to be readily removed, however, by missing the characteristically parotid engorgement in front of the ear, and by feeling as we usually can with the finger introduced into the mouth a tender spot at the junction of the upper gum with the cheek.

Chicken-pox.—In chicken-pox, after a few days of mild febrile disturbance, a few delicate vesicles begin to appear on the face, neck, and throat. They are most abundant on the trunk, appearing in successive crops, and I should look upon their presence on the scalp, which is invariable, as pathognomic of the disease. It is comparatively rare after the age of twelve, and is usually a trifling affair, although it often leaves a good deal of debility behind, and contagion hangs about longer than we might expect, leading to a troublesome succession of cases. So we had better extend our isolation period to at least three weeks. Occasionally we will meet with high fever, considerable prostration, and a copious eruption becoming pustular, and only to be distinguished from that of smallpox by its want of hard, shotty feel and of umbilication.

Smallpox.—The onset of smallpox is usually stormy. Persistent headache and flushing of the face, bleeding at the nose, well-marked dulness and

heaviness of aspect, sickness, and violent pain in the back are among the earliest symptoms, and various eruptions have been described as preceding the characteristic outbreak of pustules.

Of these the principal are—1. Measly in character, generally observed on the arms and trunk, and announcing a mild attack. 2. Scarlatiniform, usually occurring about the pelvic region and the upper part of the thighs. 3. Petechial, on the lower part of the abdomen and thighs, and usually ushering in a bad form of the disease.

When the real eruption makes its appearance, all doubt regarding the nature of the disease is dispelled. It first occurs on the third day, and on the left side of the forehead at its junction with the hairy scalp, and is papular in the early stages, becoming pustular about the eighth day, and fully maturing about the tenth. It is usually most abundant on the face; the throat is early invaded, causing much irritation and discomfort; and about the twelfth day the pustules dry into scales, which in their turn fall off, leaving reddish marks which may or may not be permanent, according to circumstances. If the patient has been well vaccinated, and more especially if he has been efficiently re-vaccinated, we may usually promise a mild attack,

free from the secondary fever which sometimes attends maturation, and from the complications and sequelæ which used to be the rule rather than the exception. Eye troubles are not often met with among the well fed and well protected, but now and then about the twelfth or fourteenth day we meet with inflammation and ulceration of the cornea, the effects of which vary from a slight opacity up to total destruction. Since the introduction of vaccination, however, we rarely meet with this troublesome and disastrous complication.

In dealing with well-to-do patients the urgent question put to us will be, 'Shall I be marked?' and, if reasonable vaccination precautions have been adopted, we can generally make the patient's mind pretty easy on this score. Under these circumstances the pustules die away without attaining their full development, and before they have had time sufficiently to impair the integrity of the true skin to cause ulceration with its resulting scar. If, on the other hand, he has not been vaccinated at all, if the operation has been carelessly performed, leaving only one imperfect mark, or if it has not been renewed, then we must anticipate pitting, which no local treatment can prevent, and which is inevitable under a condition of things which must leave a

cicatrix as infallibly as a bad burn or a surgical operation. Many fancy modes of treatment have been proposed to prevent so unfortunate a result, but common sense, I think, must show that they can have no real influence over a morbid process which runs its course according to certain fixed laws, and can only be induced to deviate from that course by constitutional peculiarities. All that we can really do is to tell the patient not to scratch his face, and to exclude the air and relieve itching by various applications, of which carbolised oil, violet powder, collodion, and a solution of gutta-percha in chloroform are the best.

In connection with smallpox the question of revaccination is sure to occur, and if a scare arises, which is not uncommon in the neighbourhood of a school, we may suddenly be expected to operate on a large number of the boys. It may be difficult to obtain sufficient quantities of reliable lymph, but I have always found public vaccinators most willing to oblige their neighbours by supplying them with excellent material with which to meet the emergency. During my stay at Rugby an alarm of small-pox rendered it necessary to revaccinate 256 boys, with the following result:—

Perfect vesicles, 33.

Good, 54.

Modified, 130.

Primary failures, 36 ; only three resisting repetition.

No bad effects were noted, the only inconvenience being very irritating itching, feelings of debility and languor invariably coming on about the fifth or sixth day, and occasional stiffness of the arm, arising from a swollen gland beneath the fold of the axilla. The leading precautions to be adopted may be most conveniently thrown into the form of propositions.

1. Take care never to revaccinate any boy without the full authority of his house-master, who in his turn obtains permission from home.

2. Never operate on any one who seems at all out of sorts.

3. See that the lymph is pure and free from blood. If we can get an infant's arm, so much the better, but recent points are preferable to tubes, the contents of which are frequently inert, probably from being over-heated during the process of sealing the ends.

4. However hard-pressed we may be for lymph, never use that from revaccination cases. The vesicles are sometimes temptingly plump and perfect to all appearance, but we will find irritation and disappoint-

ment follow any attempt to make use of their contents.

5. Always make the punctures on the outside of the arm. The inside is no doubt freer from rubbing and accidental irritation, but we are here on the line of lymphatics conveying the irritation up to the axillary glands, which show their sympathy by enlargement and possible suppuration.

6. It is good practice to make the patient lie down before we begin our operation. Vaccination is not in itself painful, but whether we work by puncture, and still more perhaps if we employ the scratching process, even strong and healthy people are apt to grow sick and faint during its performance, and sometimes even suddenly swoon away, much to their alarm. So that it is as well to be prepared for the worst by insisting on the recumbent posture.

As a general rule every one should be revaccinated once in their lifetime, and if infection seems imminent, confidence will be gained by a repetition of the operation, more especially if the original marks are few and indistinct; and Vernois has made the ingenious suggestion that certain conditions which profoundly alter the composition of the blood, such as hæmorrhage, anæmia, chronic ague, and convalescence from acute diseases, tend to what he calls devaccination,

and it is well in such cases to supply again the protection which has been impaired or lost.

Whooping-cough is usually got over in the nursery, but little boys at school occasionally have it, and our diagnostic skill will often be put to a severe test during the early stages. When it is fully developed, none but the most ignorant can fail to recognise the quick succession of short sharp coughs, followed often by vomiting and the expulsion of tough glairy mucus, and winding up with the long crowing inspiration on which the term whoop has been conferred. The puffy look of the patient about the eyes is of itself almost pathognomonic, and a greyish ulcer may often be observed on the frænum linguæ; but, considering that the patient may cough for three weeks before the characteristic whoop appears, we want to be able to answer the question whether we have any reason to suspect that pertussis may eventually appear; and unfortunately, so far as I can judge from my own experience and from a careful study of the literature of the subject, it is quite impossible to say before this characteristic symptom makes its appearance what the nature of the case is to be. It cannot therefore be a matter of surprise that this disease should be almost universal among children, for not only is it distinctly proved that the early or whoopless

cough is infectious in character, but after the disease is thoroughly established, it crowds our hospital out-patient rooms, and parents seldom attempt to adopt any special precautions. The period of incubation lasts about fourteen days, and the duration of the disease is so variable that it is very difficult to say when the patient may once more safely mix with his neighbours.

Typhoid or *enteric fever* must be regarded as one of the opprobria of our national civilisation, for it does not require much knowledge of hygiene to see that a considerable proportion of the annual deaths from this cause might be absolutely prevented. A certain proportion of cases no doubt are imported from those foreign towns which have gained an unenviable reputation as hotbeds of pestilence, but the greater number of our home epidemics are of home growth, and are initiated by scandalous want of care in sanitary arrangement. It is still an open question whether ordinary sewage contamination can breed typhoid, and the balance of testimony goes to show that the presence of some of the characteristic evacuations must be present before ordinary filth can develop specifically dangerous properties, the very slightest admixture, however, being sufficient for this purpose.

Infection may be spread by the air, but more usually by water polluted by soakage from cesspools or closets, and which unfortunately may present no deviation from its usual sparkle and clearness. A single draught of this, or of milk with which it has been mixed, or a passing whiff of sewer gas, may cause a long and dangerous illness, and the cause being casual and accidental, it may be impossible to put our finger on it with absolute precision. But every case of typhoid renders it absolutely necessary for the doctor in charge to institute a searching investigation into all the sanitary surroundings of the patient, and, as the reports of the Registrar-General show, there is usually little real difficulty in discovering some defect which may be held responsible for the damage done.

The premonitory symptoms are often so slight, and the disease may run its entire course attended by so little constitutional disturbance, that it is sometimes overlooked, and dangerous foci of infection are thus inadvertently started. Now and then a man is brought into hospital in a state of fatal collapse, and post-mortem examination shows that perforation of a Peyer's patch was the first indication that anything was specially wrong, and that he may have been actually engaged at work when the terrible accident occurred. Usually, however, overpowering weakness and malaise

are experienced, and aching in the limbs, leading up to the more definite group of symptoms, which Dr. Murchison considers as specially suspicious, *i.e.* when 'diarrhoea co-exists with frontal headache, disturbed sleep, and general febrile symptoms, increasing towards night.'

The characteristic eruption appears about the eighth day, and is often so scanty as hardly to attract notice, consisting as it does of a very few scattered rose spots smaller than flea-bites, slightly raised above the surface, disappearing on pressure, and coming out in successive crops up to the twenty-first day. These are the only absolutely pathognomonic signs, and they are occasionally altogether absent, but at the same time we have the well known pea-soup evacuations, fulness, tenderness and gurgling in the right iliac fossa, enlargement of the spleen, and a temperature ranging from 101° to 103° or 104° , rising towards evening by from one to two degrees.

Typhoid is essentially a disease of early life, so that the school doctor will be called upon to diagnose and to treat it from time to time, and he must be duly impressed with the fact that however apparently slight a case may be, it must always be looked upon as dangerous and deserving of very minute care. Absolute rest, and diet purely of slops, and

principally of milk, must be the rule until the temperature falls and the tongue cleans, but even then we must not be in a hurry to allow solid food, because relapses may occur, fresh Peyer's patches becoming involved in the morbid process, and lighting up fever and diarrhoea. After the acute symptoms are over a very dangerous condition of things may come on, indicated by scanty and painful evacuations, a dull and sunken aspect, tympanites and abdominal tenderness and a quick, sharp pulse.

This means that after the glandular structures of the patch have sloughed away, ulceration continues to go on, eating slowly downwards towards the peritoneum, which a chance movement, or the pressure of a heavy hand may cause to give way. Tympanites, sickness, and sharp abdominal pain are now signs of ill omen, and a sunken look, a small thrilling pulse, and frequent and ineffectual straining show that perforation is near at hand. The most absolute rest, the lightest diet, and the free use of opium are here our sheet anchors, and may occasionally prove successful even after a small hole has actually been made through the peritoneal covering of the small intestine.

Typhoid is not contagious in the ordinary sense of the word, and isolation of the patient's evacuations

is more important than of himself. These must be passed into a vessel containing carbolic acid, zinc chloride or ferric sulphate, but even after this precaution must not be poured down a closet, or allowed admittance into any drain or cesspool.

Destruction by fire is the most effectual means, but this is sometimes difficult to carry out, and they may be effectually dealt with by burial at a distance of several feet from the ground, taking care that the spot selected is far removed from any spring or well, or source of water supply.

Convalescence from typhoid fever is usually slow, much debility and anæmia often continue for considerable periods, and digestive derangement is the natural result of extensive ulceration of the small intestine. More especially the mental powers suffer, the memory becomes weak, and the capacity for application and continuous attention is so much impaired that it is well to allow a boy a prolonged holiday before any attempt is made to tie him down again to the routine of his school work.

We would venture to impress on school doctors and general practitioners what good service they can render by studying very carefully the earlier symptoms of infectious diseases, for at present our knowledge on the subject is rather crude and elementary, and

we are often obliged to confess our inability to predict whether feverish disturbance and general constitutional derangement mean nothing particular, or the approach of measles or scarlet fever or something else, which is readily communicable to others. Were we in a position to give a definite diagnosis in every case of the kind before the rash appears and the contagious properties of the disorder become fully developed, we might reasonably hope some day to stamp out this class of disorders altogether, and relieve humanity from much expense, inconvenience and danger. But it is quite evident that without domestic co-operation we shall never be able to attain to this possibly utopian precision, and disentangle with unfailing accuracy the essential from the insignificant from any group of symptoms which may come under our notice.

Parents often delay calling in a doctor either from motives of economy, or because they have some slight smattering of rule-of-thumb knowledge of medicine, the danger of which they too frequently find out when it is too late. Attempts have been made to lay down definite rules by which non-professional people may detect infectious diseases in their early stages, and 'Conseil d'hygiène' of the 'Department of the Seine' in Paris, and the Bureau d'hygiène

of Brussels have issued *Manuels* instructing teachers in this direction. No doubt in day schools it is desirable that those in authority should know enough to give the alarm when they see a child's hands in the active stage of desquamation, or when they observe patches of ringworm on the head, but it is a question whether they can reasonably be expected to go beyond this. The sufferer from any acute infectious disorder is usually too much prostrated to be able to get out of bed, and his parents can hardly fail to recognise the rash when it is once fairly developed, so that the teacher's diagnostic faculties are not likely to be put to the test in that direction, and parents and house-masters, or those more immediately in charge of boys, should be advised to disregard their own preconceived notions and acquire that wholesome distrust of their own skill as medical detectives which will induce them to send for the doctor at once whenever any symptoms of illness, however apparently trifling, appear.

All that they may safely know on these subjects is very tersely and conveniently summed up in an excellent little 'Code of Rules for the Prevention of Infections and Contagious Diseases in Schools,' drawn up by Dr. Alder Smith for the Medical Officers of Schools Association.

Pneumonia.—The diagnosis of pneumonia is seldom difficult. We have the general febrile disturbance, the pungently hot skin, the oppressed breathing, the sharp stabbing pain in the chest, the rusty sputa, and the crepitant râle which is absolutely pathognomonic of the disease. In young subjects, however, some variation from this group of typical symptoms may be observed. Lobular inflammation does not concern us here, as it is rarely met with after the age of two, but what we are speaking of now, is the true frank and acute involvement of an entire lobe, which we so frequently meet with in practice, and which usually follows exposure to cold or wet.

In the first place, young people seldom display the initial rigor which so usually marks the starting-point in adults, and if there really is any sensation of chill or shivering it probably passes unobserved, and cannot be remembered when the sequence of symptoms is being noted; and we may rather wonder at this absence of evidence of early nervous shock, because we know that the eruptive fevers are often prefaced in children by violent convulsions and coma which occasionally prove fatal even before the characteristic rash has appeared. I only recollect one remarkable exception to the general rule I

have just enunciated, and this occurred at Rugby in a lad of eighteen, in whom acute and alarming head symptoms preceded by at least two days any physical sign of lung inflammation.

Considering the way in which trifling febrile disturbance will suddenly run up the temperature in children, it is somewhat remarkable that even in the most violent attacks of pneumonia, the thermometer seldom registers more than $104^{\circ}-5^{\circ}$, and so rapidly are the early stages run through that we will seldom succeed in catching the fine sharp crackling so invariably attending the first few days of an adult seizure. Consolidation will usually be found well marked by the time that our attention is called to the case, and as a reduction of temperature invariably follows the development of this the second stage, we may find our patient wonderfully well in every way considering the fact that a considerable portion of one of his lungs has been temporarily struck off work; and when the third stage, or the period of resolution has set in, we will very seldom observe the subcrepitant *râle de retour* which is an almost invariable attendant on commencing convalescence in persons of an older growth.

Children seldom expectorate, so we need not ex-

pect diagnostic aid from the rusty sputa which no other disease can supply, and if we are not vigilant, we may be led astray by the tendency of the pneumonia of early life to begin at the apex. The first impulse of the doctor on being called to a case of lung inflammation, is to place his ear over the base, where it usually begins, and if he hears nothing morbid there, to jump to the conclusion that he must look for the cause of the symptoms in some other organ. In nineteen cases out of twenty, he will be right, in the twentieth he will be wrong, and will be deservedly blamed for overlooking a state of matters which he could have readily recognised had he taken a little more care, and not suffered himself to be led away by preconceived conclusions. Whenever a child is restless and fidgety, when the temperature is raised, and the skin pungent and dry, when it breathes in shallow gasps, and when it is tormented by a short sharp hacking cough, manifestly increased by exposure of the chest to the air, we should at once place our stethoscope under the clavicle and afterwards percuss lightly and gently over the same region. I say lightly and gently, because forcible tapping either by the finger or by the hammers and plessimeters which foreign physicians have fortunately not yet succeeded in popularising here, will defeat the object

we have in view, because the dulness at this point is limited and superficial and may readily be masked by the clear tone produced by the deeper lying healthy lung. Be careful to lay the finger perfectly flat between the clavicle and the first rib, as inattention to this rule may produce a spurious note strongly resembling dulness, and, by comparing one side very minutely with the other, we shall occasionally detect a slight woodenness of sound, as well as some feeling of increased resistance over the affected spot. More usually, however, we find a well marked tympanitic percussion note under the clavicle, varying from an almost startling clearness up to a mere exaggeration of the normal sound, which is very perplexing to the inexperienced observer, leading him at times to mistake the diseased for the healthy lung. In the pneumonia of the young even if the inflammation does not primarily attack the apex, it has a well marked tendency to travel in that direction, and we often find convalescence to be interrupted by a recurrence of fever, and by stethoscopic signs indicating the involvement of fresh tissue and an extension of the disease upwards until the summit is reached.

It is, I think, admitted that pneumonia of the apex is always accompanied by symptoms of debility,

and that any approach to lowering treatment is quite out of place.

Children, as a rule, do not bear the old-fashioned antiphlogistic drugging and regimen of acute disease, and more especially is this the case when the inflammation of the lungs from which they may be suffering affects primarily or secondarily the upper lobe. In such a case, it will be well to let nature have her own way, uninfluenced by anything specially heroic or elaborate in the way of medication, but keeping our eye firmly fixed on the powers of life, and seeing that the vital forces are being well kept up by good food and gentle stimulation. We shall always find that the induration at the apex is slowly removed, the deposit in the air cells being only very gradually absorbed, and that until the pulmonary percussion note resumes its normal character, the patient continues delicate and unfit for much work. And as long as any trace of dulness remains, we cannot avoid a certain feeling of anxiety more especially if any predisposition to tubercular disease can be traced in the family history of the patient.

Pleurisy is not uncommon in the young, and has the same peculiarity as pneumonia of rapidly overpassing the early stages, and remaining undetected until the more acute symptoms have disappeared.

Thus we but rarely detect the true friction sound so characteristic of the disease, but the following case will now and then come before us in practice. A boy complains that he soon gets out of breath, that he cannot run as formerly, but is short-winded and easily knocked up by anything violent in the shape of active exertion. He looks pale and somewhat below par, the alæ nasi work as he speaks, and when we strip his chest we find one side a little fuller than the other, almost motionless during the respiratory act, and if the left thorax is affected we may see the heart beating plainly in the epigastrium. It will hardly require the additional evidence of bronchial breathing and voice and loss of vocal fremitus to prove the presence of pleuritic effusion which has stolen on in this masked way, and existed from a period the precise date of which cannot perhaps be very readily determined. It is not of course the purpose of this book to lay down any precise or systematic rules for the treatment of the various diseases most common to school life, but this variety of serous accumulation may sometimes be very readily removed by cutting off all supplies of fluid and placing the patient on a strictly dry diet, so far at least as reasonable convenience allows. But it has always seemed to me hardly necessary to prescribe

any very prolonged course of roundabout efforts to remove the fluid by counter irritation or by internal drugs, when a very trifling operation may at once withdraw it with facility and safety. It cannot be good for a lung to be forcibly compressed into a small corner of the thoracic cavity, to have its air cells obliterated and its surface bound down by strong adhesions, nor can dislocation of the heart be otherwise than a source of inconvenience and even danger. An early tapping will enable the pulmonary tissue to expand and resume its functions, and will restore the heart to its proper situation, and my advice would be always to have recourse to the trocar when a short trial of other means has convinced us of their failure. Blistering and diuretics and mercury and the like assuredly weaken the patient, if they do not cure his disease, and the little operation may now be deprived of all its danger by aspiration and by antiseptic precautions.

Tubercular disease assumes a variety of forms in the young, and without entering into the many vexed questions of causation and pathology which have lately been so keenly debated, we may divide it roughly into three classes: first, tubercle of the abdominal cavity, second, of the brain, and third, of the lungs.

No. 1 refers to that wasting affection commonly

known as *tabes mesenterica* and which is not much observed during school life.

No. 2 includes the occasional but rare occurrence of caseous masses in the brain substance, but the pia mater is the structure most commonly involved, and we there meet with those small granulations which constitute tubercular meningitis appearing as a symptom of acute general tuberculosis. The early symptoms are very obscure and do not specially point to the nervous system, but whenever a child of under twelve grows dull and listless and languid, and loses flesh to however small a degree, and if at the same time it is precocious in intellect, and displays an unnatural avidity for book learning, then our suspicions should be aroused, and if we find further any family tendency to phthisis, and if the sleep be disturbed at night, and the child grinds its teeth and rolls its head about from side to side, and most important of all if he seems to have lost the freshness and irrepressible spirits of childhood and has grown what is commonly called old-fashioned, then all work should be absolutely knocked off, and mind and body allowed to lie fallow in good air. When the disease is fairly established the diagnosis is only too easy and we feel the painful helplessness of our position in being able to do nothing either in

the direction of cure or of alleviating the sufferings of the patient, which happily, however, are not of long duration. The question may be asked how far we may hope to go in the direction of prevention, and this seems evident, that the periodical and at first only occasional congestion of any organ may eventually become habitual when the circulation is sluggish, and may thus determine the direction of tubercular deposit in those predisposed to that form of degeneration; a succession of colds may bring on consumption of the lungs, whilst brain mischief may result from over-use of the mental powers in intellectual discipline which would do no harm to a healthy subject. Tubercular children usually display a love of work and a sharpness and quickness which schoolmasters may ascribe with complacency to the stimulating effects of their own teaching, and spur the morbid activity of brain on to renewed efforts with disastrous results. We know how often the infant prodigy if he survives the forcing process, turns out a failure in after life, and on the other hand, if we allow the mind to remain fallow until the constitutional vigour is thoroughly established, it will rapidly make up for lost time, and place its possessor fully on a level with those who had gone into educational harness at a much earlier age. It

is well, therefore, that the education of a child born with a strong family tendency to tubercular disease should be conducted with extreme caution, if it be attempted at all during the most dangerous years, and that suspicion should be aroused when he begins to mope and pine, to sleep restlessly, and to lose flesh. Any permanent diminution in the fresh and elastic spirits universal at this early age without ostensible cause, should be looked upon with distrust, and the medical man thus put on the scent will seldom fail to discover other indications of mischief.

It is sometimes not an easy matter to diagnose the cause of a cough, but as a general rule we may say that in many cases it proceeds from the throat, and has nothing whatever to do with any morbid condition of the lungs. Inspection of the fauces will often detect an elongated uvula, or enlarged tonsils, or a congested or granular condition of the mucous membrane, which is responsible for a bark or hawking sound equally irritating to the sufferer and his neighbours, and appropriate treatment will usually prove successful; or we may have to deal with a stomach cough or an ear cough or with simple hysteria, or there may be some actual pulmonary affection requiring careful diagnosis, into which it is not our province to enter here. When the school

doctor has taken all the possible causes of the symptom into account, general principles will teach him what to do, and we may sometimes see the propriety of prescribing change of air and cessation from work. But he may also tell those who consult him that much may be done by self-denial, by resolutely refusing to yield to the momentary gratification of removing the irritation by a cough which infallibly makes matters worse in the end, and keeps up the congestion on which it depends. Rest is here, as in most inflammatory conditions, of service, and if we have the resolution not to cough when the temptation is strongly on us or if we can steadily direct our attention to something else, we will often break the troublesome habit, and stay the tickling and worrying sensations which we at first thought almost impossible to bear.

Coughing may of course be caused by too cold a room, by dust, or by irritating vapours, and attention to the removal of these unnatural conditions will naturally be all that is required.

Rheumatism.—Acute rheumatism is not uncommon in the young, and the conditions of school life often directly predispose to it. Whatever view we may take of its pathology, whether we agree with those who believe it to be of nervous origin, whether we hold

with Dr. MacLagan that malarial poisoning is the true cause, or whether we pin our faith to the popular belief that it commonly follows exposure to damp and cold, there can be no doubt about the connection, whether it really be that of cause and effect, between the disease and the last named group of events. A boy comes back from a house-run perspiring and exhausted, he flings himself on the ground to recover breath, and remains in that position until he is thoroughly chilled, or after a thorough soaking in a brook he neglects to change his clothes entirely and at once. He feels cold and uncomfortable during the rest of the day, but if he is strong and vigorous he sleeps well in the night and is not troubled with any further inconvenience. But if, to use a popular phrase, he has a weak point anywhere the derangement of circulation caused by the wetting or the chill will congest the place least able to bear the strain, and an explosion of some kind will follow: perhaps only a slight feverish attack or cold in the head, possibly a bronchial catarrh or inflammation of the lungs; but more probably than either, and most especially if any hereditary predisposition—which may be traced in 27 per cent. of cases—exists, sensations of stiffness and soreness will gradually become accentuated into acute pain in some particular joint

or joints, and he is now compelled to face all the pain and peril of an attack of rheumatic fever.

It is well to remember the frequency with which the ankle is first attacked, and the natural liability of confusion following the patient's belief that his symptoms are due to a purely local cause. A boy comes limping to see the doctor, and to consult him for a sprain, and although he cannot remember exactly where the accident happened, he supposes that he must have twisted his foot without taking much note of it at the time. There is undoubtedly enough heat, redness, pain, and swelling to justify his appearance on the sick list, but in addition he seems generally out of sorts, his head aches, he looks dull and confused, his tongue is loaded, his temperature raised several degrees above normal, and cross-examination will bring out the history of one or more shivering fits. There is nothing so important in the treatment of acute rheumatism as to begin it early and to carry it out with consistent determination, and so, despite the remonstrances of the patient who thinks his sprain hardly deserving of so much special attention, we place him between blankets, diet him on milk, and give him the salicylate of soda every four hours. And although he will probably be much worse next day, and set fast by the simultaneous

involvement of other joints, we have made a good start, and given him the best chance of escaping the dreaded prospect of cardiac complication. For this is the great difference between the rheumatism of the old and the young, that during the adolescent period of life, and more especially in the case of boys, an attack of the disease in its acute, or even in its subacute form, is extremely liable to be followed by heart mischief. The actual proportion in cases at all ages is 50 per cent., and the cautious medical adviser will do well to warn the head master and the parents that there is a dangerous rock ahead, and that in spite of every care, and all the resources of science, the patient is extremely liable to permanent damage from the consequences of endocardial inflammation.

From day to day the anxious inquiry will be made whether the heart continues to be unaffected, and the answer will not be easy in every case, although we know that the first week is the most dangerous time. The diagnosis of pericarditis is usually put beyond a doubt by its readily recognised physical signs, but when the deeper structures are involved, mischief may steal on most insidiously and the valves may be spoilt before any symptom indicates what is taking place. We cannot even give the consoling

assurance to those around the patient that a slight case is less dangerous from this point of view, because it is precisely in this class of cases that the heart is apt to suffer. Given a good stormy straightforward attack with high fever and violent joint inflammation, and treatment will probably act rapidly and well, and the external manifestations of the effects of the poison may probably divert its attention from the internal organs. When things progress however in a half-hearted subacute way, the fire does not burn itself rapidly out but smoulders on ready to blaze up again, and until the temperature falls and the tongue cleans we cannot give a cheerful prognosis. Nothing can be more unsatisfactory than to see the gradual development, if we may use such a phrase, of a cardiac bruit after the patient, whom we had considered and perhaps guaranteed, as free from risk, has begun to get up and move about. The contraction of the new material deposited in and around the valves prevents them from fulfilling their duty of closing the orifices which they are called upon to guard, and the stronger action of the heart rendered necessary by the more active life of the patient, shows us the amount of damage done. And the sad duty now devolves on the doctor of announcing the depressing fact that the previously strong and healthy patient must con-

sider himself as more or less of an invalid during the remainder of his life.

Much discussion has been expended on the possibilities of avoiding heart complication by treatment. Some eminent authorities believe that careful nursing can do more than drugs, whilst others express enthusiastic faith in the preventive efficacy of a variety of remedial agents, whose very number excites some not unnatural suspicion. It is quite evident that if we can give the patient anything which will cut short the disease, we lessen his chances of heart implication, although on the other hand, we know that such risks are by far most common during the first few days, and are unhappily sometimes developed before he comes under professional care. The search after some specific preventive of peri- or endo- cardial inflammation is hardly likely to be successful, because the fibrous structures of the heart are attacked by chance or according to some law which we do not understand in succession to the regular joints, and we might as well expect to administer a drug which will obviate the chances of rheumatism seizing upon the wrist or shoulder as the mitral valve. All that we can do is to keep the heart quiet by perfect rest, and by an absolutely equable temperature, aided by blankets and by flannel investment, and indicated by

the thermometer, to lessen the acidity of the urine by farinaceous food and by alkalis, and to reduce the force and length of the fever by the salicylates.

Beware of relapses, which are only too common, and as the muscular structures of the heart become weak and flabby and sodden during the attack, it is well to keep the patient very quiet for some time after convalescence has fairly set in. And if there is any reason to suspect cardiac mischief, a prolonged retention of the recumbent attitude will prove to be good economy in the end.

When a young person has once had an attack of acute rheumatism, he is extremely liable to a recurrence, and if his heart was involved the first time, it will very likely be so again, and the situation will then become one of grave peril. Whether he is thus predisposed through himself or through his forefathers, he should be warned to avoid cold and wet, to wear flannel next the skin, and to change his clothes absolutely and at once when they are either damp or soaked with perspiration or with water. It is a mischievous delusion to fancy that rheumatism can only be developed in winter, for India is well known to furnish numerous and most intractable cases, and we must constantly preach in and out of season the doctrine of invariably changing wet clothes.

The enormous and disabling frequency of chronic rheumatism among our labouring population is undoubtedly due to their confirmed practice of sitting before the fire, for the purpose of drying their wet clothes, either because they cannot be troubled to take them off, or because they do not possess a change. In combination with bad sanitary and dietetic arrangements, this inveterate habit is certainly responsible for a good deal of that painful and disabling malady which too often cripples strong and active men not much past the prime of life.

The medical attendant is sure to be closely questioned on the following points. First: How long is the case likely to last? He will do well not to give any hopes of assured convalescence before the end of three weeks, for although pain and fever may subside under the influence of the salicylates, relapses are very common in spite of treatment, and will cause much disappointment if due warning be not given. The next question will be: How long will it be before a boy may safely resume school work after a well developed attack of acute rheumatism? And here of course his reply must largely depend on circumstances—the gravity of the symptoms, the length of the case, and the constitutional peculiarities of the patient must all be taken into account, and it must be

remembered that prolonged anæmia and debility usually follow, and are undoubtedly increased by the drug treatment usually pursued. Relapses are not uncommon after full convalescence has been thoroughly established, and the cardiac structures remain feeble and flabby and liable to damage by strain and resulting dilatation for periods more or less prolonged, so that from every point of view it is well to prescribe quiet and comparative rest for at least six weeks. But the most crucial and anxious enquiry will be made in the case of boys whose complete recovery is marred by the sad legacy of a cardiac bruit, and in whom careful auscultation discovers a well marked bellows murmur at the apex. Is this functional or organic, and if organic is it absolutely and necessarily permanent? and what is its precise bearing on the lad's physical future and on his school life? In other words what is the prognosis to be?

On first consideration it would seem as though nothing can be easier than to give a complete and straightforward answer to this query and to lay down such a code of regulation as will satisfy all the necessities of the case. But in reality the situation is one of some difficulty and even complexity, on account of the supreme issues at stake to the principal actor concerned. In the first place the painful

fact must be broken to the patient that his heart is affected, that his life in the future must be in some respects different to what it has been in the past, and that some of the more violent games in which he takes special pleasure, and in which perhaps he specially excels, must henceforth be forbidden fruit. After the first shock is over, the patient will probably hear the bad news with resignation, because he is at a hopeful time of life, and because the doctor will be able to relieve his mind on several points of vital importance, but it is just possible that the interview with his parents may not be quite so satisfactory. Perhaps his father may have dabbled a little in medicine, may have read Watson and glanced at the *Lancet* in his club, and with the dogmatism of imperfect knowledge he may be inclined to question the management of the case, and to ascribe the disablement of his son to want of care and skill; and if the medical man be young and inexperienced and just a shade hyper-conscientious, with a faint dash of morbid suspicion that the case might have turned out better if it had been treated in some different way, paterfamilias may derive confirmation of his views from the want of self-confidence with which his arguments are met.

A little tact and firmness and knowledge of the

world, however, will usually get over difficulties of this sort, and the position of the medical adviser will of course be made all the stronger if he has taken the precaution of fortifying his own opinion by that of the best consultant within reach, by whom his line of action can, if necessary, be confirmed, and who can assure the anxious parents that all has been done that could be done to ward off the unhappy complication which all so greatly deplore. And the next question will be: Is the cardiac disorder necessarily organic and therefore permanent, or is there even a faint chance that it may be functional in character and therefore remediable by time and care? Cases are on record in which a mitral bruit following rheumatism has gradually disappeared under the influence of prolonged rest and tonic drugs, but these are so few and so exceptional, that it is hardly necessary to take them into consideration in forming our prognosis, which must be based on the belief that the valve is hopelessly damaged, and that we must frame our measures accordingly.

Agreed then that we have to deal with a mitral systolic murmur, the parents will wish to know, and the enquiry is a very natural one, whether nothing can be done to remove or to relieve the morbid condition, whether no drugs or external applications can

release the valves from their morbid association with new material and set them free. Possibly the old-fashioned idea may be brought forward that mercury or iodide of potassium, or blisters may promote the absorption of the effused lymph and effect a cure, but there is no shade of difficulty in the way of the decided opinion that none of these things can here be of any avail, and that we may as well hope to remove a scar on the hand or a tumour on the head, as to restore a crumpled and contracted cardiac valve by internal remedies.

This question being settled, we have next to state our opinion on the prospects of health and longevity of the patient. What can he do, and what can he not do? What should his future line of action be, may he remain at school, and under what rules and restrictions?

Now of course it is quite obvious that a boy who enters the race of life with heart disease is very seriously handicapped, and unhappily his competitors are not very likely to allow him even a single yard's start. He has perhaps the period of puberty to pass through when radical organic changes are being worked in his constitution, he may have hereditary tendencies to disease which are now more or less aggravated, and the many years which stretch out before him

are full of the worries and strain and anxieties and disappointments from which not even the most successful career is wholly free, and he has to meet all these with damaged resources, and with the certainty that he is less able than his fellows to face the perils of acute disease or of accident, and to force his way through the struggling crowd of eager competitors which choke up every opening. Yet he has probably to make his own way, and to become self-supporting when his education is over, with the discouraging prospect staring him in the face, of exclusion from everything into which competition enters, and in which a certificate of physical fitness is required. He is debarred from the army and navy, the Indian civil service, and most of the public offices, and is reduced to a narrow choice of niches within which to shelter himself from the breezes of the world. But to begin with : What are we to say about his actual state of health, present and to come ? To the ordinary mind the announcement of heart disease is like a sentence of death, as involving a condition of terrible uncertainty and grave peril, in which a fatal result may be looked for at any moment, and incessant care be required, to keep the functions of life going in a really useful way. To a certain extent this is true, but the prognosis of such cases is very much more

hopeful than it used to be, because we are now beginning to recognise that when the tissues are well nourished, and degenerative changes have not begun to set in, a very fair degree of bodily vigour may be maintained even when the stethoscope reveals advanced and formidable disease. Of course, valvular disease largely increases the work and consequent responsibilities of the heart, but nature arranges anatomical compensation by increased growth, and a thicker and stronger ventricle is fully equal to the augmented duties which it is called upon to do, and therefore we see repeated instances of fairly long life in connection with heart disease, where a bruit perhaps has been detected by accident, or where the patient has lived and worked on for years with the full consciousness of his malady. As long as compensation keeps up, and bodily vigour is maintained all goes well, and a loud and prominent bellows murmur, instead of sounding the death-knell of the patient, is really a subject for congratulation as Broadbent points out, because it is a sign that the heart muscle is in good working order. It is when advancing years come on, and when anxiety and worry and depression and failure begin their insidious operations that the innervation of the heart begins to fail, and when those frightful seizures which are known by the

name of angina pectoris make their appearance and embitter the short remnants of life. Nutrition now begins to fail, fatty degeneration injures compensation, and dilatation throws the weakness of one valve back upon another until dropsy and varied congestions and manifold discomforts and miseries make a sum of existence from which death is a happy release.

It is highly probable that the school doctor, if he be young and fresh from hospital practice may be disposed to take somewhat of an over gloomy view of the case, basing his opinion on his observations of those unhappy wrecks of humanity who strive amid the depressing surroundings of the out-patient room to find some alleviation of their sufferings, or of those scarcely happier beings who find a brief mooring in the hospital ward before the billows close over their head, and particularly devoid of hope will he incline to be if he has seen much of children's diseases among the poor, for under their unhappy circumstances of life these badly fed and clothed and housed victims of social inequality are singularly ill-fitted to withstand another addition to their hard lot in the shape of an organic affection of the heart.

But his patient is waiting anxiously for his verdict, and it may now be his pleasant duty to relieve him of much of the vague terror and anticipation of coming evil which the first announcement of his condition

has inspired. He may be told that although his heart is undoubtedly affected he may reasonably hope for a life of useful activity and moderate duration if ordinary care be exercised. That he may remain at school and do his work as usual, avoiding of necessity the rougher games, and confining himself to cricket and lawn tennis; and although violent running and jumping must be forbidden, a certain amount of carefully graduated gymnastics under the eye of the instructor may be allowed and even encouraged, and in most large schools facilities are now afforded for pleasant country excursions in connection with natural history science, which will provide him with gentle and sociable exercise.

Prognosis must depend of course in some measure on the particular valve involved. The maximum of danger attends implication of the tricuspid, the aortic comes next, and fairly good health can often be sustained for considerable periods in connection with simple mitral regurgitation, stenosis being much more dangerous in its nature.

Cardiac strain is occasionally met with in school-boys, and causes symptoms so sudden, so definite and so very alarming as to be worthy of careful attention.

Of course at that early age, we do not meet with the aneurismal dilatation of greater or lesser degree

which occasionally spring from violent exertion in after life, or the snapping or rupture of a valve which has been known to follow powerful effort. Tissue degeneration is necessary for the production of these accidents, but what we meet with in the young is dilatation of the left ventricle causing mal-adjustment of the mitral valve and consequent bruit. In all the cases of this nature which I have been able to collect, some weakening influence was at work, the weather was hot and exhausting, the patients had been working hard and were deficient in nerve energy, and the vagi being weakened by exertion the heart's force is enfeebled as shown by acceleration of pulse which becomes collapsing and irregular. Thus Dr. Clifford Allbutt graphically narrates his own case, when during a fairly stiff Alpine ascent, undertaken in an untrained state, he was seized with most distressing faintness and dyspnœa, and was enabled by percussion, to place beyond all doubt, the fact of a very greatly distended right heart, which fortunately speedily regained its tone after rest; and Dr. Dukes has recorded the following interesting case:—

On February 22, 1873, at 1.15 p.m., B——, aged eighteen, while undergoing active exertion, suddenly fainted. I was summoned at once, and he was carried

to bed, and revived in a few minutes, and asked for water. He then dozed for a short time and vomited twice at 2 P.M. I examined the heart and found the sounds healthy at the base, but at the apex a loud systolic murmur, disappearing towards the base, but still loud in the axilla. On February 23, at nine A.M., no bruit was to be heard, the heart's action was normal, and he was quite well.

I have myself met with a few of these cases, of which the following is the best marked. A strong healthy lad of eighteen came to see me one very hot afternoon in the middle of a cricket match during which he had violently exerted himself. He complained of acute pain in the left breast with faintness and urgent dyspnoea, the action of the heart was very weak, rapid, and irregular, but no bruit could be detected.

At eight P.M. I was again asked to see him, and found him much worse, the pain having become very severe over the heart's apex, where it was decidedly increased on pressure. The cardiac action was still irregular, although of fair strength, and a soft bruit could now be distinctly heard to follow the first sound between the fifth and sixth ribs. It appears that this relapse was due to his return to the cricket field in spite of my strict prohibition, and playing vigorously

until forced to desist from breathlessness and pain. Next day it was noted that he had passed a good night, was free from pain and felt quite well. No trace of bruit, pulse forty, regular and full. On the 20th, after using more exertion than usual, he was seized with another return of pain, the murmur was again distinctly audible, and the cardiac pulsations were greatly increased in frequency. Next day when the symptoms had again subsided, the pulse had gone down to forty, and on the 23rd he was well enough to go home. Such cases as these are by no means frequent, and when they do occur it will invariably be found that they depend for their existence on some deviation from a full condition of health and strength, and that the cardiac disorder is consequent on some cause or causes predisposing to enfeeblement of general vigour, and more especially to diminution in the effective force of its own nerve supply.

Prognosis is invariably good, but care must be taken to enforce a prolonged period of abstinence from violent muscular effort.

I have been favoured by my friend and former colleague, Dr. Broadbent of St. Mary's Hospital, with the following very practical remarks on cardiac strain in connection with muscular effort which are of especial interest as being the outcome of a wide expe-

rience and prolonged attention devoted to this important subject:—

‘I have met with no instances of boys who would otherwise have been considered to be in perfect health breaking down from athletics. The effects of over-strain on the heart which have come under my notice have been dilatation of one or other ventricle with or without regurgitation through the auriculo-ventricular valve. I have met with no recent example of damage to the aortic valves, though I have seen cases of aortic regurgitation in adult life which could not be traced to any cause but athletics at school or college.

‘In my individual experience the effects of over-strain have been about equally common in the right and left ventricle. When the right ventricle has been affected there has usually been violence as well as exertion, such as injury in a football scrimmage or a severe fall or blow, and the subjects have either been physically weak or more or less anæmic. The action of the heart has sometimes been irregular for a few days or even weeks, but not always. There has never been any considerable extension of the area of dulness or displacement of the apex. The most noteworthy sign has been a loud harsh systolic pulmonary murmur heard over a considerable area

in the left second and third spaces and conducted upwards and outwards. The beat of the conus arteriosus may sometimes be felt. It is not easy to explain the production of this murmur but of its causation by over-strain I have had repeated evidence in its gradual subsidence with rest and care, its prolonged absence, and its reappearance after violent exertion. I have not met with audible tricuspid regurgitation.

‘The cases in which dilatation of the left ventricle has occurred have been in boys, or young adolescents, with abnormally high arterial tension. They are often strong and robust in appearance though sometimes pale but they are subject to headache and belong to the class of boys whom Dr. Dukes of Rugby has found to be liable to temporary albuminuria. The physical signs have always been those of hypertrophy with dilatation, displacement of the apex downwards and to the left, the apex beat being fairly powerful and distinct, but felt over a larger area than normal. I have very rarely met with a mitral murmur but the first sound may be reduplicated. As the heart regains its previous condition of moderate hypertrophy the apex will move inwards, but little, if at all, upwards, becoming more defined and circumscribed.’

Indigestion is not uncommon during school life, and principally arises from the two extremes of gluttonous excess among the well to do, and insufficient or unwholesome food among the poor. The medical man will readily diagnose these cases, and treatment is not difficult if he is able to lay down strict conditions of dietary, limiting the quantity and simplifying the quality of the meals consumed in the first class of patients, and adding to the scanty nourishment of those whose means unhappily restrict them to a coarse and insufficient fare. Symptoms he will treat according to general principles, and appropriate remedies will speedily remove the dull frontal headache, muddy look, and yellowish conjunctivæ of biliary congestion, whilst a good emetic will often act like a charm when a loaded tongue, nausea, and total loss of appetite show that the stomach has been over-tasked and is striking against its work.

When diarrhœa seems to be the result of irritation of the intestines, and when there are griping pain and scanty evacuations, with headache and sickness, astringents will only add fuel to the flames, whereas a mild purgative such as castor oil will sweep away the offending substance and put everything right.

When diarrhœa becomes epidemic or when it has clearly been caused by exposure to cold, and if cholera

is near or likely to come near, then gentle astringents with aromatics are the best remedies, and will usually prove successful.

It is perhaps hardly necessary to warn practitioners against the rash use of the eliminative method of Johnston, or against the plan so enthusiastically extolled by some German physicians of giving large doses of calomel at the outset of a case of typhoid fever.

The opposite condition of constipation should be treated in the young by diet, exercise, and other simple means, rather than by purgatives, the frequent use of which encourages a sluggish intestinal habit, and adds greatly to the evils of sedentary occupations in later life. Their carefully regulated use forms one of the most delicate problems of ordinary practice, and tact and dexterity in dosage and combination are more likely than anything else to gain and keep the confidence of patients.

It may not be out of place to give a caution in such a case as the following:—

A boy comes with pain in the right flank increased by pressure, constipation of some days' standing and a raised temperature, and there may be some temptation to order a purgative to relieve his symptoms. But such treatment will have disastrous results, for

he is suffering from typhlitis or inflammation of the loose cellular tissue surrounding the cæcum, caused by inflammation and perhaps perforation of the vermiform appendix. Under quiet and opium all will go well, whilst if the physical rest of the bowel is disturbed by aperients or by solid food, peritonitis will probably follow, and the recovery of the patient will be extremely doubtful.

The frequency of headache during school life seems to be much greater on the continent than here, as Dr. Treichler tells us that in the schools of Paris, Darmstadt, and Nuremberg one third of the scholars suffer habitually from this symptom. We have elsewhere referred in some detail to the evidence brought forward by Crichton Browne and other observers, to prove their contention that educational pressure exists to a large extent in England, and that headache is one of the most frequent indications of this condition. Derangement of circulation from periodical congestion acting on anæmic and enfeebled cerebral centres is the cause of the pain, and there is no doubt both that a dull frontal aching is not uncommon among children who pore much over their books, and that suffering is also complained of by the pale and half-starved children of the poor even before their education has begun. We thus have the head-

ache of anæmia and of congestion, as well as that which is symptomatic of disorder of the stomach or liver or other internal organs, and that which constitutes the first signal displayed to warn those who are on the outlook with experienced eyes, that some acute febrile disorder is coming on. Then we have the sharp stabbing agony of neuralgia, and the dull ache of rheumatism, and the intractable nerve storm of migraine, and the periodical explosion by which the liver and stomach sometimes pay off long standing scores against their possessor in the form of a bilious attack. The experienced practitioner will readily recognise these varying conditions and direct his treatment according to general principles, of which quiet and rest, and tonics and alteratives and mild aperients, are not less important than the strict regulation of diet.

Throat affections are very common and troublesome in the young, and when they appear in anything like epidemic form we should always suspect some sanitary defect, and more particularly something wrong with the source of water supply. This is especially the case with *diphtheria* which is bred by bad drainage, and which is a disease of most alarming severity and danger, proving fatal in many cases. Its diagnosis is not difficult, profound debility and

prostration being early noted as quite out of all proportion to the throat mischief which in the first instance is not specially characteristic in appearance. There is much pain and difficulty in swallowing, with deep injection of the mucous membrane, and it is not long before all doubt is removed by the absolutely pathognomonic exudations of false membrane deposited on the uvula and tonsils. Early detection is of great importance as this is one of the most infectious of all diseases, and many lamentable deaths have occurred among mothers and medical men who have inhaled the deadly germ during their sick-room attendance.

In the progress of the case we must remember the not remote probability of a fatal result, from rapid sinking, or from the formation of a clot in the heart; and when convalescence is apparently established we must carefully watch for the beginning of the well-known nervous sequelæ, ranging from a slight snuffling or nasal tone up to a condition of almost complete paralysis, in which the patient is absolutely helpless and unable to move hand or foot or even to open his eyes. It is satisfactory to be able to give a favourable prognosis under such a truly formidable condition of things, and to be able to tell the friends of the sufferer that time will restore him to the full use of his faculties and to a state of

unimpaired health. Diphtheria is fortunately rare, but being often confounded with other diseases, the general public have the belief in its comparative frequency pretty firmly established in their minds. There is a special form of follicular tonsillitis, which resembles it in some superficial respects, and which is often mistaken for it. This begins with a good deal of fever and constitutional disturbance, and on inspection of the throat we find rather a remarkable condition of things, consisting of deep red injection of the palate, and of the tonsils, which are swollen, and studded with brilliant white specks, composed of exudation at the follicular orifices. When these run together, as they sometimes do, they present something of the appearance of a diphtheritic patch of exudation, and the diagnosis may be rashly given accordingly causing much anxiety and alarm. But these cases are quite devoid of danger, they are soon over and leave no bad consequences behind, but being extremely contagious they must be isolated, promptly and absolutely. When in medical charge of Rugby School I had occasion to treat an epidemic of this nature which attacked fifty boys, and which would have affected a considerable proportion of the school had not vigorous means of suppression been successfully carried out. Ulceration of the tonsils is usually

ushered in with rigors or hot dry skin with headache and a full bounding pulse; and scarlet fever may readily be suspected either here or in the case of tonsillitis, or quinsy, which begins with very fiery feverish symptoms giving rise to grave suspicion. In case of doubt, which may sometimes be unavoidable, we had better suspend our verdict for twenty-four hours, and meanwhile keep the patient in bed, and in a room by himself: a line of treatment eminently judicious when we have to deal with any acute febrile disorder.

When quinsy runs on to abscess, the symptoms become most distressing and even alarming to the uninitiated, but we can always promise a favourable ending to the case, produced either by nature or by art. Although there is much discomfort from swelling, and pain shooting from the throat to the ear, much distressing hawking of tenacious mucus, and almost total inability to swallow, we may observe with satisfaction that there is no difficulty in breathing, and that the constitutional depression is not out of proportion to the local cause. Steaming of the throat is here of service, with weak acid gargles and chlorate of potash; but if we can discover the collection of matter, a very trifling incision will give instantaneous and almost magical relief. We cannot hope to gain

any assistance from inspection, as the jaw is generally pretty tightly clenched, but if we can slip the finger between the teeth we may detect a soft and fluctuating spot just below the tonsil, into which the point of a well guarded bistouri may be plunged with great advantage to the patient. It must always be remembered that all acute throat affections are attended with great prostration and debility, and require tonic and supporting treatment. Frequent supplies of fluid nourishment must alternate with occasional sips of wine, and the preparations of iron, preferably the tincture, must be given at regular intervals. Convalescence is usually slow, anæmia and weakness are left behind and are removed with difficulty, and one attack is liable to be followed by another, until what is popularly called a weak point is permanently established in the throat. The patient is then apt to have a recurrence of quinsy after exposure to cold, he easily loses his voice, or is troubled with elongated uvula, or granular pharyngitis, which must be met by appropriate treatment, or with enlarged tonsils which become enormously swollen from time to time. We are sure to be asked what best should be done with these little tumours, and whether they can be lessened or removed by internal or local remedies, and our reply must be firm and decisive that only an operation is of any avail. Although not a real

source of danger, they spoil the voice, cause pigeon breast and a good deal of respiratory embarrassment, and the ingenuity of modern surgery has so improved the means for slicing them off that this process should always be advised as safe, speedy, and effectual.

Numerous deviations from the standard of perfect health are met with in the young, to which no special name can be given, and which will make considerable demands on the tact and experience of the doctor. Among the children of the poor, pallor and languor and general debility are only too common symptoms, and can only be relieved by what it is too often out of our power to furnish, good food and housing and clothing, and change of air. When our patients are in better circumstances, we can usually remove such evidences of constitutional feebleness or overstrain, by total stoppage of work, by a careful and varied dietary and by a trip to the seaside; and in the case of girls we must not forget the special peculiarities of constitution which render them liable to a variety of nervous symptoms, and to anæmia and chlorosis, about the time of puberty. Dr. Dukes has drawn attention to a condition of great importance which he has occasionally observed shortly after puberty, and which he considers due to the increased vascular tension developed at that period.

He calls it the albuminuria of adolescents, and points out that it may be produced by a sudden change of temperature, by errors of diet, severe exertions or mental emotion. 'When a boy feels poorly and disinclined for work, a furred tongue and headache with a firm pulse not relieved in a few hours by remedies makes me look for albumen.'

The treatment is by absolute rest in bed and milk diet, and under this the albumen quickly vanishes, but too often reappears on a return to meat and exercise. Such cases require careful watching, as they occasionally, although not frequently, run on into chronic kidney disease.

We have already referred to the occasional occurrence of scorbutic symptoms in the young, and their connection with certain dietetic irregularities, which when discovered, can very readily be put right.

Ulceration about the gums occasionally presents itself for treatment and may possibly be caused by the milk of animals suffering from foot and mouth disease, or by something wrong in the water supply; and it will usually be found that there is a good deal of difficulty in establishing a healthy healing action, leading up to perfect recovery.

A wide variety of conditions of somewhat indefinite nature cause short and sharp feverish attacks

in the young, and require the exercise of much diagnostic tact on the doctor's part. Errors of diet, exposure to cold, over-work of mind or body, bad drainage, may suddenly bring on a hot skin and a rapid pulse, and apparently grave constitutional disturbance; and it may be quite impossible during the first twenty-four hours to say what is going to happen.

If the feverish symptoms show a tendency to recur, if a high temperature be succeeded by sweating, and if we can trace any indications of periodicity in the attacks, our suspicions will naturally point to ague, which is not uncommon in early life, and which is, fortunately, completely under the influence of quinine.

The wary practitioner must be perpetually on the outlook for sanitary defects, as indicated by deterioration in the health of his clients. Languor and depression and general 'seediness'—to use a slang term—result from the possibly unsuspected contamination of our air or our water with sewer gas, and mysterious outbreaks of sore throat, or peritonitis, or lung disorders, or digestive derangements are graver evils which spring from the same cause. And when his suspicions are thoroughly aroused, he will usually have no difficulty in tracking out the source of danger and putting everything to rights.

Intimately associated both with rheumatism and heart disease is *chorea*, a disease almost, although not quite, restricted to early life. It is most liable to occur between the ages of six and eight, and is not therefore very likely to come under the eye of the ordinary school medical attendant, save perhaps at rare intervals in preparatory institutions. But in public hospital practice it assumes a very direct and important bearing on our present subject, because most of the cases under observation will occur in children attending school, and in some of these at least it will be possible to trace a direct connection between their symptoms and the strain and stress of early educational work.

Opinions differ among experienced authorities about the actual causes of this distressing malady, but there is no doubt that any sudden nervous shock, by fright or otherwise, often proves the starting point, and I have elsewhere given the evidence on which I base my contention that chorea is sometimes the result of the worries and anxieties of school on brains weakened by scanty nourishment and bad hygienic surroundings: a state of matters partly due no doubt to fright, partly to morbid zeal and absorbing interest in lessons, and partly due to the overstress laid on anæmic cerebral centres. With the intimate pathology of this obscure affection we

have nothing to do, and its symptoms are sufficiently well known, ranging as they do from slight twitching and fidgety movements of the face up to a condition of unrest in which every muscle seems to share by turns in the general co-ordinative confusion; and swallowing, speech, and reason itself are weakened, or even abolished. The prognosis is good except when the explosion is due to a strongly marked neurotic tendency, which may eventually make its influence felt in some more serious way, and the only indication of treatment to be observed is the absolute necessity for sending the patient home at once. He must on no account be allowed to associate with other children, as the symptoms are very contagious by imitation; and solitary confinement in the school sanatorium is, in itself, so depressing as seriously to jeopardise the early recovery of the patient. A case of the kind lasts on an average two months, and some period of convalescence must be allowed after all morbid movement has ceased, because until full strength is regained, relapses are not of infrequent occurrence.

Erythema nodosum is common in the young, and is almost invariably met with on the leg, below the knee, over the muscular mass outside the shin bone, in the form of firm rounded subcutaneous nodules

about the size of a filbert, assuming at first the look of an early abscess, but soon dying away through somewhat of the various tinting of a bruise. They usually show a rheumatic tendency and require careful constitutional treatment.

Skin diseases have been somewhat artificially complicated by the labours of dermatologists and the elaborate classifications which they have introduced; and ordinary practitioners often profess their incompetence to do more than place the case under the care of a specialist. It has always seemed to me that this savours somewhat of superstition, and that cutaneous affections run as a general rule within pretty narrow grooves, and are comparatively easy of diagnosis. If their treatment is too often unsuccessful and difficult, we must seek for the explanation in the variety of constitutional and pathological causes on which they depend, and which are as yet only imperfectly understood, and we often find that the surgeon who seems to cure his cases best is least able to give a scientific explanation of his proceedings. The scope of the present volume prevents us, of course, from going at any length into questions of etiology, or description of symptoms, but a few points may be briefly stated. In the first place, some forms of skin disease are congenital in

character and may be said in a general way to be beyond the reach of treatment. Others are no less certainly hereditary, but as a rule the varieties most commonly met with in practice are acquired during the earlier years of life, in some way which is often mysterious and difficult of explanation. The most hopeful line of investigation is that which forms our second head, and which encourages us to seek for the causation of skin eruptions in various diathetic constitutional tendencies. For example, nothing can be more certain than the dependence of psoriasis and lepra and some other of the chronic disorders of a scaly nature on neurotic causes, and their treatment can only be successfully attempted by nervine tonics, such as arsenic, antimony, &c. Struma again is undoubtedly responsible for some very obstinate varieties, such as lupus and various superficial ulcerations. Syphilis has its distinct manifestations on the skin, and gout and rheumatism also make their influence felt in this direction. These and other practical indications for treatment must always be borne in mind, and we must remember another point of much importance, which is to draw a careful distinction between the acute and chronic stage of the same disease, as the drug which benefits the one will do harm to the other. As an illustration

of this, we have only to take the case of eczema, which when it presents all the evidences of active cutaneous irritation in redness and itching and smarting and profuse watering discharge, is infallibly made worse by arsenic, whereas the same drug when prescribed after the evidences of inflammatory action have passed away, seldom fails to effect a cure.

Thirdly we must remember the potent influence of dirt and neglect, and more especially of bad food and sanitary conditions in encouraging this class of diseases, and the very satisfactory results to be gained by soap and water and good nourishment. The pale, thin, and feeble children of the poor, are very subject to skin eruptions, and the mode of treatment most likely to be successful is to be found not in any elaborate system of scientific medication, but in tonics and regular meals, and various simple lotions and ointments according to circumstances.

In school practice the infectious class of skin diseases gives the most trouble, and there are others on the border land which are often met with, and which at first sight would seem to be both formidable and obstinate. Foremost among these is what is popularly known as 'scald head,' or according to dermatological nomenclature, *eczema impetiginodes*, in which profuse sero-purulent discharge mats the

hairs together, and forms a tangled mass of confusion, amid which vermin readily accumulate.

Nothing can be conceived more unsatisfactory than the attempt to treat a case of this sort without using the scissors freely and thoroughly exposing the bare scalp, when we often find the eruption to be really very trifling in character and easily cured. And if the parents object to what they may consider an unnecessarily summary procedure, we may generally succeed in removing their scruples, by pointing out that if the hair be allowed to continue in the state of filth and neglectful confusion which is inevitable under circumstances which render cleanliness impossible, its nutrition will become seriously impaired and it will either fall out or grow thin and weak. Pediculi are very common among the poor, and may be said to be almost universal among girls who wear their hair long, and are unfortunately prevented by their wretched circumstances from doing more than make a superficial show of outward cleanliness. The back of the head is the favourite habitat of the parasites, and we usually find them swarming there, causing much itching and irritation, followed by glandular enlargement and by a variety of chronic eczema which is incurable, so long as the cause remains. The most effectual mode

of treatment is to cut the hair quite short, but if this cannot be carried out, the best application is paraffin, which not only kills the insect, but also detaches the obstinately adhering shells over which the most vigorous application of soap and water has not the least effect.

Itch is also very common among the class of children attending certain of our board schools, and being very infectious, must be carefully isolated during the progress of treatment. The experienced eye will have no difficulty in forming a diagnosis from the marks of scratching distinctly visible on the abdomen and thighs, from the cuticular burrows on the inside of the wrist and between the fingers, and best of all, from the capture of the *acarus* itself as it lies at the bottom of its abode. The cure is rapid, by sulphur, but we must be careful not to use any of the pharmacopœial ointments in their full strength to the young—as they will cause irritation on their tender skin with secondary eruptions of a troublesome nature—and we must remember thoroughly to disinfect the clothes.

Contagious impetigo is another troublesome affection, and is seldom seen during the pustular stage. Heaped-up yellowish crusts on the chin and lower part of the face, with swollen cervical glands, and

small whitlows on the fingers being quite characteristic of a disease which is extremely infectious, and invariably runs through the children of a family. Isolation is necessary and a cure may be rapidly effected.

None of the skin diseases mentioned above, are likely to come often under the care of the medical officer in charge of our large public schools, because they are largely dependent for their existence on filth and neglect, which afford a fitting nidus for the reception and development of the contagia. It stands to reason that a dirty skin seldom invaded by soap and water will furnish a much more congenial resting place for parasites than one which is continually disturbed by the (to them) distasteful process of ablution, and this is no doubt the reason why medical men in large practice among the poor hardly ever catch scabies, with which they are of necessity often brought in contact. Another fertile factor in the encouragement of all chronic cutaneous affections is mal-nutrition from deficient nourishment, the feeble and ill-fed much more readily falling a prey to these troublesome disorders than those whose regular and well-digested meals produce a condition of robust health. Most emphatic testimony to this was given some years ago by Dr. Balfour at the Duke of York's

School, where he found himself powerless to prevent the frequent occurrence of very obstinate eruptions on the scalp, until he was able to introduce substantial improvements into the dietary of the boys.

The most troublesome, intractable and contagious of all skin disorders is undoubtedly ringworm, and although it occurs most frequently among the dirty and ill-fed, we are often called upon to treat it in the upper ranks of society, and as often have to regret the slow and too often imperfect means at our disposal for effecting a permanent cure. The principal varieties met with in practice are favus and tinea tonsurans, which in spite of opinions to the contrary held by eminent authorities are generally believed to depend on the presence of separate and distinct parasites. Favus, which owes its existence to the achorion Schonleinii is however very rare in England, although its sulphur-yellow, cup-shaped crusts, and unmistakable mousy smell, are tolerably familiar to those who have pursued their medical studies north of the Tweed.

Tinea tonsurans, on the other hand, is extremely common in children of all nationalities, Dr. Alder Smith¹ telling us that at Christ's Hospital 'the average percentage of boys who have had the disease un-

¹ *Ringworm*, 3rd edition.

known to their parents, or have been thought to be well, when first brought for admission is *eight*.' The same observer some years ago looked over a boys' school (lower middle class) and found more than half had *tinea tonsurans*; and: 'Again in 1882 I examined a public institution, where I found forty-six out of forty-seven boys, and thirty-seven out of forty-five girls, had ringworm of the head.' We cannot be surprised at the prevalence of this troublesome affection, when we remember that it is caused by a microscopic fungus, the '*trichophyton tonsurans*' which burrows deeply into the cuticle and the substance of the hairs, and very readily disseminates itself by contagion. It is obvious, therefore, that day schools and nurseries and out-patient departments and chance meetings on the street, and the operations of the hairdresser, and even the air itself in which the characteristic spores have been discovered, provide extensive facilities for the spread of the disease, and make us wonder—not that it is met with from time to time, but that it is not universal in childhood.

The earlier stages are seldom observed, as they are quickly over; and the itching '*papules*,' followed by pin-headed vesicles on red base at the circumference of a slightly raised and scaly spot, 'which

speedily follow infection, soon give way to small patches covered with furfuraceous scales, and brittle hairs, breaking short off at the surface of the skin.' ¹ Before the characteristic stumps appear, the case is often mistaken for chronic eczema, no precautions are taken to prevent infection, and an error of this kind may prove the starting-point for a long and troublesome series of cases. At this time the only real method of diagnosis is to 'scrape the surface and examine the epidermic scales under the microscope for the fungus,' but when the disease is fully developed it can hardly be mistaken for anything else. The patches are usually situated at the vertical or parietal regions, and vary in size at first from a split pea to a five-shilling piece, they are circular in shape, and covered with dull white scurf and broken and brittle hair stumps, much resembling a monk's tonsure, or a badly shaven beard. When we remove one of these loosened stumps from its bed, and after previous treatment with liquor potassæ place it under a magnifying power, of 450 to 900 diameters, we find the shaft and root to be invaded and split up by the conidia and beaded mycelium of the parasite which causes the disease, and we can only give the patient a clean bill of health when careful investi-

¹ Alder Smith.

gation fails to detect any more of these the active principle of the disease. Dr. Alder Smith who has given great attention to this subject, tells us that the disseminated variety is often difficult to detect, and that half-cured cases are often sent out as cured because the hairs seem to be growing freely and firmly. Minute inspection with a lens must invariably be carried out, and thus we may discover scurf, broken hairs, and isolated stumps with gaping empty follicles, which will at once put us on the right scent after the parasite, which is absolutely pathognomonic.

Ringworm is said to be less infectious to persons over twenty years of age, and is rarely contracted after fourteen, but we must invariably insist on a strict quarantine, with an occasional exception in favour of a boy whose presentation to an endowed school might be lost by the time necessary to effect a cure running him over the age at which he can be received, or where a chance infection might injure his prospects by preventing his passing his examination, or competing for a scholarship. In such a case if it be slight and disseminated in character, and already under the influence of treatment, the patient may be allowed to remain at school, under certain well-defined precautions, his bed and bedding being

kept apart from others, his head being well covered by a cap, and carbolic oil permanently applied to the affected parts.

The Medical Officers of Schools Association, in the Code of Rules to which I have already referred, makes the following reference to this subject at p. 21, under the general heading of ‘When may a pupil who has had an infectious disease go home, or rejoin the school?’—

‘Ringworm: when—the whole scalp having been examined in a good light, and any suspicious spot scrutinised with a lens, no broken-off, stumpy hairs (which give evidence of the ringworm fungus when carefully examined under the microscope) are to be detected.’

Alopecia areata is another troublesome disease affecting the scalp, and creating much alarm by the baldness which it causes. Its cause is unknown, and it is doubtful whether it be infectious, although it often appears in several members of the same family; and although it is very intractable up to a certain point it usually disappears spontaneously at or about puberty.

Certain other eruptions come under the notice of the medical man charged with the duty of treating the diseases of early life, and although this is not a

systematic treatise on Practice of Medicine and Surgery, a few hints on this subject may not be out of place.

A few patches of herpes on the lips or chin usually mean some kind of feverish seizure, ranging from pneumonia down to a mere cold in the head; but a much more troublesome affection is herpes zoster, following the distribution of the fifth nerve, and when affecting the eye (as it sometimes does) causing a good deal of conjunctival inflammation sometimes associated with corneal ulceration.

When the 'shingles,' as it is popularly called, appears in its usual place on one side of the chest, we only meet with, as a rule, a very moderate amount of that neuralgic pain which renders this disease so painful and intractable in later years, and if the patient be careful not to irritate the patches by rubbing or rough treatment, we may promise a rapid and permanent cure.

Roseola æstiva is very rarely observed, but in its brilliant red colour it may simulate scarlet fever: and certain drugs such as quinine, chloral, copaiba, salicylic acid, iodide of potassium, and santalin cause in rare instances, eruptions of an erythematous, papular, or measly character, which may excite a passing shade of doubt in the doctor's mind. Of

course he will often be called upon to diagnose nettle-rash, and will have no difficulty in doing so from its raised irritable wheals, sudden onset, and evident signs of digestive derangement.

I remember being on one occasion much puzzled to account for a very peculiar measly rash on the hands and wrists of a couple of boys at Rugby, until they furnished the explanation themselves, which was that they had been handling a particular kind of caterpillar, and that the hairs, or a viscous secretion, had the power of irritating the skin. I was at first a little sceptical about this, until experiment proved that they were right, and it is just possible that the recollection of this experience may be of service to others placed under the same circumstances.

Warts on the hands are very annoying to boys, but as they always disappear at puberty, it is hardly necessary to try any treatment; and acné, about which the doctor will often be consulted, also, as a general rule, dies away about that time. But it is very unsightly while it lasts, and may leave pits as distinct as those of small-pox. Ferruginous tonics with saline aperients, the vigorous application of soap and water, the occasional use of stimulating ointments, and a dietary largely composed of vegetables will be found to constitute a rational treatment.

There are few, if any, specialities in the surgery of school life, for the various accidents and injuries sustained by boys as a consequence of the rougher games are not, as a general rule, either frequent or dangerous, and do not differ in type or severity from those which may occur under strictly domestic conditions. Sprains are, of course, at the head of the list, and should always be treated with a good deal of care and ceremony. It is hardly necessary to tell the sufferer from a severe wrench of the ankle that he must keep quiet, because the acute pain and absolute helplessness of the foot put the very idea of movement out of the question, but neglect may produce very serious consequences in slighter cases. A great deal of joint disease results from neglected strains in strumous constitutions, and absolute rest should be enforced as long as any traces remain of inflammatory action. When pain and tenderness have subsided careful strapping will give efficient support, and will enable the patient to exchange the dreary tedium of inaction for a certain amount of cautious exercise.

Diagnosis is often difficult, and occasionally impossible in the early stages, between a fractured fibula and a sprained ankle where excruciating pain and rapid swelling prevent full examination and

mask symptoms. The medical officer must here give a guarded opinion, fortified in his uncertainty by the undoubted fact that the treatment must be precisely the same in either case, and must be directed at first solely to the removal of inflammatory symptoms.

Sprains of the wrist are always tedious and troublesome, and if neglected may gradually run on through a series of painful relapses and half-cures extending over a period of months, or even years, into chronic joint disease from which there is no escape but operation. In a bad case of the kind all the resources of surgical experience may be unable to decide with certainty that the lower end of the radius is not fractured, and as a mistake would not only be discreditable to the doctor but damaging to the patient, every case which allows even the shadow of a doubt, should be treated most carefully with splints. No harm is done by tying up a simple sprain for a few weeks, but an overlooked fracture of the wrist involves distortion and grave interference with the perfect usefulness of the hand, which may seriously compromise the prospects of the patient in after life.

But of all the sprains we are called upon to treat the most irritatingly obstinate is that of the knee.

It occurs in its worst form as a football accident, or in the early stages of bicycle practice when the rider falls sideways on the leg, which is wrenched violently outwards, stretching and perhaps tearing some of the tissues about the joint. Some evidences of inflammation follow, with copious effusion which shows no tendency towards absorption, but which remains *in statu quo* notwithstanding treatment of every kind.

The joint is at least double its natural size, and the patella floats about on the surface of a quantity of fluid which bulges out the synovial pouches in every direction, and makes the limb weak and practically unfit for use. I have known these cases run on for three or four months without perceptible change, whilst the health of the patient begins gradually to decline from the want of fresh air and exercise, and the blistering and other local means deemed necessary for his cure. Even after the effused products have disappeared, as always happens in time, the stretched ligaments cannot at once regain their normal tone, and the muscles of the leg must recover the substance which has been wasted by disuse. Benefit sometimes follows the vigorous application of pressure by means of Martin's bandage, and when everything else fails antiseptic aspiration may be confidently recommended as a safe and speedy

remedy. The researches of Lister have shown that we may open the knee and other joints with perfect impunity as long as we carry out his precautions with rigid care, and it would seem a positive injury to our patient to let his health suffer from confinement, and his joint from prolonged soaking in turbid fluid, when a harmless prick will at once do what our painfully roundabout means have hitherto failed in effecting. Still more annoying are those apparently slighter forms of sprain, where we can see or feel nothing wrong, but where pain and discomfort follow anything beyond gentle exercise, and where a jar or twist may lighten up more pronounced mischief. Gentle counter-irritation, friction, and the cold douche may do much in combination with careful bandaging, and it is worthy of note, that a return to more active habits of motion may sometimes effect a cure in very long standing cases, when the patient is chronically convinced of the necessity of almost perfect rest, and when the muscles have almost lost their power of keeping the joint braced up in proper position.

‘Lawn-tennis elbow’ as it is popularly called, is a frequent, painful and troublesome affection, and depends on periosteal inflammation of the outer condyle, and perhaps the head of the radius, with a

little effusion into the joint, caused in all probability by the continuous jarring of the bony surfaces upon one another whilst the racquet is being used. The leading symptoms are extreme tenderness to pressure, and great pain in the elbow when anything is forcibly grasped by the hand; and rest and counter-irritation are the most effectual means of treatment.

Hip-joint disease comes on very gradually in early life, and with symptoms of so insidious a nature that they are frequently overlooked. When a boy without ostensible reason begins to limp and to bear whilst standing most of his weight on one leg, when he complains of pain in the knee, when the buttock on one side is found to be flatter than on the other, and when deep-seated tenderness can be made out on firm pressure in the groin or rotation of the limb, then suspicion must yield to certainty, and we shall do well to place him at once on his back on a firm flat bed, and treat him with the long splint, until all symptoms have subsided.

A curious form of sprain special in my experience to football is a small bursal swelling in the sheath of the quadriceps extensor tendon, exactly over its insertion into the tubercle of the tibia. It is most remarkable how much inconvenience this apparently trifling disability causes, by weakening the leg, and most

especially diminishing its kicking power, a serious matter to a lad in the prime of muscular vigour, and a prominent football performer. There is a good deal of analogy between this and that affection so well-known and dreaded by horsekeepers under the name of a 'curb,' the treatment being slow and unsatisfactory, and nature effecting a cure leisurely and in her own way by hardening of the surrounding tissues.

Periosteal swellings on the shin are of course common enough, they are painful and temporarily disabling but never run on to abscess if treated with reasonable care. They gradually harden into permanent bony lumps like the splints in veterinary surgery, and are apparently in some cases valued by their owners as links of association with old school days and school sport.

I have once or twice seen the radius bent by a fall, and of course we must be prepared to meet with various fractures and dislocations, although I have already pointed out how infrequent these major forms of accident are, considering the undoubted roughness of many of the games most popularly in vogue.

Bones are less brittle in early life than when the period of growth is thoroughly past, and they withstand the stress of wrench or blow with a certain elasticity which disappears with advancing years. A

broken clavicle will now and then however come under observation, and may be treated without a single hour's confinement to bed, and even fractures below the knee may early be put up in rigid bandages, and movement on crutches allowed within cautious limits.

Dislocations of almost every variety may be met with, and can usually be reduced, if seen early enough, by simple manipulation. Very great and natural alarm may be excited by a rare form of accident in which partial dislocation of the neck takes place, and where the head is twisted in a way which strongly suggests the probability of a fatal result. A cautious attempt at reduction should be made, and nature herself sometimes steps in to restore the parts to their natural position, and in either case it may be well to enforce rest in the recumbent position for several days.

Spinal curvatures have a very important bearing on school life, and are undoubtedly caused by badly arranged seats and light. Distrusting my own experience of this somewhat abstruse subject, I have asked my friend, Mr. Edmund Owen, who has directed special attention to its details, to favour me with some remarks, which I have pleasure in placing before my readers:—

‘*The influence of school life on development.*—The

attitude which is habitually assumed by a boy or girl at work or play must necessarily influence the manner of growth of the various tissues subjected to strain and pressure. For in early life even the bones are soft and easily moulded, and a slight but constant pressure brought to bear upon them, be it at first but ever so little out of the normal lines, may eventually produce irremediable deformity.

‘It becomes, therefore, a matter of the first importance that the desk and the form, the book and the light which falls upon it, should be arranged so that the pupil may have command over the subject in hand without undue fatigue and without lolling into vicious positions.

‘Among the most important prejudicial effects of a cramped or long-continued stooping posture is this:—That the doubling up of the chest interferes with the free and efficient working of the heart and lungs; and thus the circulation of the blood in distant parts of the body, as in the fingers and toes, grows slow and inefficient, and the subject is rendered more than ever liable to cold hands and to chilblains. Then the constant stoop becomes part of the boy’s physical character, and the imperfectly developed chest is shallow and unmanly, and the shoulders are rounded and falling forwards.

‘Fortunately the intellectual and physical education of the rising generation is now much better understood than it was fifty years ago. Then it was considered a sign of good breeding that a child should sit bolt upright in the chair without venturing to seek the support of its back. Indeed, the subject of education has now itself grown into a science.

‘The result of prolonged continuance in the unsupported erect position is that the muscles of the spine become tired out, and the work of keeping up the back is thrown on to certain fibrous bands or ligaments, which are incapable of feeling fatigue. But these bands cannot prevent the bony segments of the spine from undergoing a certain amount of rotation and vicious readjustment, which is at last rendered apparent in a “growing out” of the hip and shoulder or other manifestation of lateral curvature of the spine.

‘Such a curvature is not *disease* of the spine any more than the bending of a quickly growing plant is evidence of unhealthiness; it is the prejudicial effect of gravity upon a structure requiring support. The plant is tied to a stick or nailed up against the wall; the weakly spine should be afforded the welcome help of the back of the chair or form. Every form should have a back, and the pupil should be

encouraged to make use of it. The back should not be high or slanting, as this would "only favour a negligent reclining position," it should just come across the loins, and then, with a wide seat and a foot rail, the pupil can work away at the greatest advantage, sitting fair and square at his desk or table.

‘The commonest variety of spinal curvature is that in which the right shoulder is raised above the level of its fellow; the outline of the chest being found fuller upon the right side than upon the left, and the right hip being unduly prominent. This association may frequently be detected by the practised eye, though in a very slight degree it may be, in the direct examination of the back of many a growing or full-grown person. But usually it is not until such deviation has been permitted to become developed into actual deformity that surgical advice is sought for it.

‘The reader can easily appreciate the manner of the development of this deformity by placing himself at the table as if about to write a letter or a page of a copy book. He then leans forward with his left hand and wrist upon the table and the left elbow hanging by his side, the right hand and elbow being of course upon the table. At the same time the

weight is thrown on to the seat of the chair, chiefly from the left haunch-bone, and the paper placed about opposite his right shoulder. Then the loin part of the spine is inclined towards the left, the spine itself considerably rotated and the right side of the chest and that shoulder considerably raised. In this way the natural curvatures of the spine are intensified and fresh ones introduced. The left side of the chest being thus compressed, the ribs fall together, whilst those of the right or full side of the chest are opened after the manner of a fan. The right shoulder is raised and the lower angle of the shoulder blade rendered unduly prominent. The constant assumption of this position at last becomes habitual, characteristic and perpetuated.

‘Probably the first step in the production of the deformity is the weight of the body being thrown chiefly on to the left haunch-bone; and then, especially if the seat be low in proportion to the desk or table the spine is thrown into an accommodating bend, the convexity of which is directed towards the right shoulder. A slight deviation may also be found—but in the opposite direction—in the loins, and another compensating one in the neck. In some instances it is the left shoulder which “grows out,” and especially so when the subject is left-handed.

‘As regards the special dealing with the subjects of lateral curvature of the spine, all that need be said in this place is that the deformity should not have been allowed the opportunity of making its appearance. That if it be slight in amount its further advance may be checked by an artful alteration of the level of the seat; by discouraging study in the favourite sitting posture; by the taking of more exercise in the open; by joining in games to an extent short of absolute fatigue, and by methodical exercises with light dumb-bells and “chest expanders.” It is well also that after the girl has grown weary with sitting she may rest her tired back for half an hour or more in a reclining chair. For this purpose the light cane “deck chair” with a sloping back, such as can be obtained at any outfitting warehouse, answers well.

‘When the pupil is at work he should be sitting equally on each haunch-bone, the head and spine should be in the straight, median line without lateral deviation or twist, and without unusual bending forwards. The fore-arms should be upon the table, or desk, about half-way to the elbows.’

The school doctor should make no attempt to meddle with *dental surgery* which is so exclusively handed over to specialists as to withdraw its practice

entirely, save under exceptional circumstances, from the hands of the general practitioner. In a case of real emergency he should of course be able to extract a tooth with rapidity and skill, but whenever practicable he should advise a consultation with some one more competent than himself whether the aching molar is beyond the reach of scientific stopping, and he should counsel frequent visits to the dentist in order to correct irregularities and arrest early decay.

Occasionally a good deal of nervous and digestive derangement attends the eruption of the wisdom teeth, and he must be prepared to look for this cause, in cases of difficulty.

If a tooth is knocked fairly out of its socket by a blow, it should at once be replaced, and a confident hope expressed that it may regain firmness and vitality, and if it be merely loosened in its place we may almost certainly expect it soon to recover if the gum around be healthy.

Ear diseases do not form the most hopeful or satisfactory part of surgical practice, and without fully subscribing to the old-fashioned division into two classes, one of which may be cured by syringing and the other cannot be cured at all, we are bound to admit that failure often attends the most persevering

efforts to alleviate the miseries of deafness. The school doctor however will rarely be called upon to do more than attend to comparatively trifling ailments, to ear-ache, to catarrh of the tympanum; and probably to advise in the case of boys suffering from chronic discharge, and it will be well for him to recognise the gravity of this condition, for as it almost invariably depends on some deep-seated affection of the tympanic cavity involving probably the bony structures, we must not forget the perilous neighbourhood of the dura mater and the danger of the inflammation suddenly becoming acute and spreading towards the brain.

Pain over the mastoid process, headache, sickness, or vertigo, associated with cessation of discharge are symptoms of danger, and must be met by prompt and appropriate treatment; and as a general rule we must insist on perfect cleanliness and constant care. The purulent fluid secreted in such cases is usually rather offensive, and must be washed away by gentle syringing with weak disinfectant lotions at intervals during the day, and the risk of accumulation of inspissated secretion in the tympanum or the mastoid cells will thus be reduced to a minimum.

A boy will sometimes come in great alarm to the doctor to say that he has suddenly become deaf, and

on inspection we shall usually find a hard plug of cerumen blocking up the outer ear, and interfering with the passage of sound. He has not perhaps paid much attention to the gradual diminution in the sharpness of hearing which has been going on, until the mass shifted its place, causing complete occlusion, and giving rise to uncomfortable sensations from pressing on the *membrana tympani*. We are sometimes advised to effect a preparatory softening of the wax with oil before proceeding to remove it, but this is quite unnecessary; and taking a large syringe, pulling the ear forwards and outwards, inserting the nozzle gently backwards, and propelling a full stream of warm water firmly and continuously around the offending substance, we shall soon have the satisfaction of removing it from its bed, and with it all the symptoms complained of by the patient.

It is well in any case of doubt thoroughly to explore the inside of the ear, and this can very easily be done by reflecting the light from a lamp placed behind the patient's head by a laryngoscopic mirror through an ordinary speculum. We can now see whether there is any amount of ceruminous accumulation, whether there is ulceration or chronic inflammation of the mucous membrane, whether we can discover a polypus—which is not very uncommon—and

which causes irritation and discharge, and whether the tympanic membrane be intact or perforated.

Beyond this in diagnostic subtilty, the ordinary medical attendant cannot be expected to go.

Accidents may happen from blows or falls, and the membrana tympani has been ruptured by a slap on the side of the head from the palm of an enraged dominie. The teaching of the books tells us that bleeding from the ear in a case of cranial injury is the worst of all symptoms, and the young doctor, ever on the outlook for rarities, when called in under such circumstances will unhesitatingly pronounce the terrible words: 'Fracture of the base of the skull.' In many, perhaps in most, instances he will be right, but we know that very free hæmorrhage may follow a purely local lesion, and that the rent in the membrane may heal up without leaving any bad result behind.

Sometimes a foreign body gets into the ear, and before the doctor arrives, things have probably been made worse by injudicious attempts at extraction by one of the sympathetic group of friends who usually appear on these occasions. Someone more distinguished by officious zeal than knowledge will probably attempt to get out the bead, or button, or ear of corn, or whatever it may be by probing and digging with

any convenient instrument that may come to hand. Irritation and laceration of the mucous membrane and perhaps perforation of the membrana tympani may be the result of such ill-judged interference, and when the scientific authority appears on the scene, pain and bleeding may prevent his doing anything more than prescribe soothing applications until all swelling has subsided. And when he may safely proceed to dislodge the enemy, he will find that gentle syringing with warm water will do all that is required.

Deafness is sometimes responsible for what masters from want of knowledge or minute observation may consider dulness, or stupidity, or inattention; and the medical attendant's attention should be directed to any case in which a suspicion of defective hearing can arise, and it will be well for him to remember that in addition to causes proceeding directly from the ear, occlusion of the eustachian tube may result from enlarged tonsils or a congested throat, and may bring about a defective sensibility to auditory impressions.

General practitioners cannot of course pretend to understand every complicated case of *eye disease*, but they may reasonably be expected to know enough about the subject to treat minor ailments, and to see when rocks ahead require the guidance of a more skilful pilot. What should we think of a doctor who

went on prescribing for a case of violent inflammation of the eye with leeches and fomentations, whilst a foreign body which caused the symptoms remained undetected below the upper eyelid? And we fear that blindness has sometimes resulted from the headache and constitutional disturbance of glaucoma being put down to some different cause, and the golden opportunity of operating at the right moment lost for ever. The school doctor will not be called upon in all probability to diagnose very difficult cases, and if such occur he must call in the best specialist procurable to his aid. Ordinary examples of inflammation will readily yield to rest, darkness, frequent bathing with warm water, or poppy-head decoction, followed by an occasional drop of some mildly astringent lotion, and strumous ophthalmia must have its appropriate constitutional treatment. It must not be forgotten that troublesome conjunctival irritation may result from an ingrowing eye-lash, which being very small and whiteish in colour may readily escape observation, and when a smouldering sort of inflammation seems to be going on without ostensible cause we had better evert the upper lid and see whether a granular condition of the mucous membrane is keeping up continual friction and discomfort.

In crowded schools where sanitary conditions

are not carefully supervised, and where the children are badly fed, chronic ophthalmia often prevails to a large extent and cannot be got rid of by ordinary means. The infection may be spread by the air, in which pus cells have been discovered on microscopic examination, but more commonly by the indiscriminate use of towels, sponges, or napkins, or even of the water in which the eyes are bathed. Mr. Nettleship has reported on some of these epidemics for the Privy Council, and has advised strongly against the overcrowding of dormitories, against bad air and light, an insufficient dietary, and dirty and slovenly habits, as the principal causes to be got rid of, if we hope to stamp out a painful, destructive, and disfiguring disease.

Accidents are more likely than disease to engage the doctor's attention. A direct blow on the eyeball may rupture the globe, or dislocate the lens, or cause hæmorrhage into the vitreous or the retina, or even into the sheath of the optic nerve, but such deplorable results of violence are fortunately rare. Foreign bodies, however, frequently get into the eye and may be removed without difficulty, careful search being sometimes necessary to discover their whereabouts. When we have failed on superficial inspection or by depressing the lower lid to find the offending

body, we must evert the upper lid—and this may readily be done by laying a pencil or pen, or other conveniently slender body, across the upper edge of the eyeball, drawing the lid downwards by means of the lashes, and then turning it outside in with a quick and sudden movement. We shall often find a grain of dust or other irritating substance lurking in the folds of conjunctiva, but if we are again unsuccessful we must carefully examine the cornea, and see whether anything is adhering to its surface. It is well known that the anterior elastic lamina readily retains anything more especially of a metallic nature which gets into its grip, and removal is not always easy. The foreign body must be dug out by a little scoop specially made for the purpose, and the irritation which remains, as well as that caused by simple abrasion of the epithelium from a scratch or slight blow, is best relieved by a drop of perfectly pure castor oil, and seclusion from the light for a short time.

If the cornea is cut by a sharp instrument, as occasionally happens, all we can do is to avert inflammation by rest and cold; and the protrusion of the iris which sometimes follows must be treated by atropia or calabar bean, according to circumstances.

A black eye is unsightly and inconvenient, and if

it cannot be entirely prevented it may be lessened by the immediate application of ice, which contracts the vessels and limits the effusion of blood. It is perhaps doubtful whether we can do more than this, although careful painting with arnica is usually held to be efficacious in aiding the removal of the extravasation, and the application of powdered horse-radish has also some reputation for effecting the same purpose, which seems rather to be founded on tradition than on scientific experience.

When the blood is poured out beneath the conjunctiva it presents a very alarming appearance, but we can always reassure our patient, whilst inculcating patience as a good mental discipline during the disappearance of the unsightly discoloration which nature can alone effect.

Spontaneous hæmorrhages in this situation, and more especially when they appear in the morning, should lead us to suspect those slight nocturnal epileptiform seizures which often pass unobserved.

Various affections of the eyelids call for special attention. We have already referred to granular lids which keep up a continual irritation of the cornea and are excessively difficult to cure—often in fact, resisting all treatment; and the sago-grain granulation occurring in connection with ophthalmia

should always lead us to suspect that the disease will assume a contagious and perhaps epidemic form, and rapidly spread through the school if prompt measures of isolation be not enforced.

Tinea tarsi, as it is sometimes called, and which consists in inflammation of the roots of the eyelashes, is very common in dirty and ill-fed children, and if neglected it usually leads to total loss of hair and much deformity and discomfort. Care and cleanliness seldom fail to effect a complete cure.

A succession of styes indicates something wrong with the general health, and if they affect any number of boys in a particular house, it may be well to look into the sanitary arrangements and see that nothing is wrong with the drainage.

The question of eyesight in schools is one of the highest interest and importance, and I am much gratified to be able to present to my readers the following remarks from the able pen of Mr. R. Brudenell Carter, who has made this subject quite his own :—

‘On eyesight in schools.—The growth, development, and functional activity of the eyes, as of other bodily organs, are materially influenced by the nature and amount of the work which is demanded from them ; and this influence is more powerful in proportion to

the immaturity of the subject. In what may be called a state of nature the eyes of the human race would be chiefly employed in ranging over a view of considerable, or at least of moderate, extent; and would be only occasionally called upon for the close inspection of near objects. The well-proportioned "emmetropic" or "normal" eye is so constructed as to obtain perfect distant vision, that is to say, of objects not nearer than twenty feet, when it is in an absolutely passive condition as regards individual adjustment, and in an almost passive condition as regards its convergence towards its fellow. As the object of vision comes nearer than twenty feet, and in a constantly increasing ratio as the distance is diminished, the hitherto passive eyes are compelled to assume an altered shape and direction, and to maintain these alterations by stress of muscular effort. Each eye individually obtains clear vision by an effort which increases the convexity of its internal lens; and the two obtain combined or binocular vision by an effort which causes each of them to rotate upon its centre, and to turn inwards in such a degree that the visual axes of the two, if prolonged, would meet upon the point of sight. The former effort is made by a muscle within the eyeball; the latter by one which is external to it, and which, by

dragging upon the ocular tunics at its point of attachment, is capable of altering the shape of the eye.

‘It would not be difficult to show that the process of literary or scholastic education, as applied to the young, has called upon the eyes for close application to small objects in a constantly increasing degree; or that the circumstances of high civilisation—partly in consequence of the aggregation of mankind into large cities, in which the range of vision is limited by buildings of a monotonous character, presenting little variety of aspect and exciting little curiosity—partly in consequence of the pressure of engrossing topics of reflection or mental occupation, by which the tendency to notice or observe external things is diminished, are unfavourable to the growth and development of the eyes and to the activity and keenness of their functions. The circumstances of civilisation tend to the production, and promote the handing down to offspring, of eyes of an inferior type; the prevailing methods of teaching promote the alteration in the shape of the eyeball which is produced by prolonged convergence, and which constitutes the defect known as short-sight. It may be added that eyes of inferior type or of faulty shape, when subjected to undue convergence strain, are more liable to suffer injury than those which are of

normal proportions and of natural acuteness of vision.

‘The general result of these conditions is that many schools are manufactories of short-sight. The question was first investigated by Dr. Cohn, of Breslau, who examined the eyes of 10,060 scholars, and published the results in 1867. Among the whole number, he found 1,072, or more than 10 per cent, who were short-sighted ; and he found that the short-sight increased steadily, both in numerical prevalence and in degree, as school life was prolonged ; being least frequent and least pronounced in the elementary schools, more frequent and more pronounced in the intermediate schools, most frequent and most pronounced in the finishing schools. In elementary village schools he found only 1·4 per cent. of short-sight ; in town elementary schools 6·7 per cent. ; in two gymnasia, 26·2 per cent. ; and in the two highest classes of these gymnasia 55·8 per cent., more than half the students being affected. Cohn attributed the increase of short-sight entirely to excessive convergence, and thus indirectly, to the prevalence of conditions which compelled the students to bring their eyes very close to their work, the most important of these conditions being the defective lighting of schoolrooms, and faulty shapes

and proportions of desks and seats. His investigations have since been repeated by at least forty observers, and upon at least fifty thousand children, in various parts of North and South Germany, France, Russia, America, Sweden, Switzerland, Holland, and, on a small scale, in this country; with the result that, notwithstanding variations in the percentages found in different localities, the general statement made by Cohn, concerning the progressive increase of short-sight, both in amount and in degree, has been abundantly verified. Not only Cohn himself, but Von Reuss in Vienna and Reich in Tiflis, have examined the same schools a second and third time, after intervals extending in one case to six years, and have established the steady increase of the degree of short-sight in the same individuals, who, in the meantime, had risen from the lower classes to the higher ones. Mr. Priestley Smith, in Birmingham and its neighbourhood, found about 5 per cent. of short-sight among 2,158 board-school children, whose ages were from seven to thirteen years, the great majority being between eight and eleven. Among 357 students in training colleges, persons taken from the same class, or nearly so, as the children, and of ages ranging from 18 to 23, he found short-sight in 72, or 20 per cent. In a board-school in South London,

among 267 scholars, all of them young children, Mr. Adams Frost found 26 who were short-sighted, or 9·6 per cent.; and Mr. Roberts has published the results of an examination of 595 boys, made at Marlborough College by one of the masters, from which it appears likely, even when due allowance is made for want of technical skill in conducting the inquiry, that short-sight exists there in greater proportion than even in Mr. Priestley Smith's training college.

‘The first attempt, as far as I am aware, to go beyond Cohn's somewhat mechanical explanation of the increase of short-sight was made by Drs. Loring and Derby, of New York, who pointed out that other elements should be taken into consideration, such as the health and nutrition of the children, their inherited tendencies, the ventilation and general state of the schoolrooms, and so forth. Even if we admit that the progressive character of the affection is directly due to the dragging of the muscles in over-convergence, it must still be expected that the ocular coverings of children who are themselves feeble, and who are placed under unwholesome conditions of living, will yield more readily than those of children originally stronger, and who are placed among more advantageous surroundings. Cohn's

inference was, beyond all question, that sound and well-formed eyes, if subjected to the conditions of school work which he found prevailing, were in danger of becoming short-sighted. Why it was that under similar conditions some suffered while others escaped he made no attempt to explain; and the observations of Drs. Loring and Derby formed the first step in this direction. When once the idea of what may be called special vulnerability in certain eyes was accepted, it was seen to afford a possible explanation of many difficulties; and the clue thus furnished has been followed, with marked perseverance and success, at Philadelphia, by a committee of investigation which was presided over by Dr. Risley. This committee examined the eyes of 1,298 children, devoting to each child an average time of twenty-eight minutes; and they succeeded in establishing that eyes originally of imperfect development—such as those which are flat from front to back, and are technically described as “hypermetropic,”—eyes which are astigmatic, or of different curvature in different meridians, eyes with defective harmony of their adjusting and directing muscles, and those generally which, by reason of any defect or malformation, work with difficulty, are especially likely to undergo the change of form which renders them short-sighted.

They also established that the seeds of permanent mischief are often sown at quite an early period of education, and that the conditions of work in infant schools, or preparatory schools, and the management of the junior classes in larger schools, are matters which deserve the first attention of any who are responsible for the results.

‘ Among those who are engaged in education, as among parents, there may possibly be some who would regard the existence of short-sight, and even its increase, as a comparatively trivial evil. There is a wide-spread belief, how arising or how maintained it would be difficult to say, that short-sighted eyes are “strong” eyes: whereas the truth is that an eye which is short-sighted is necessarily a “weak” eye, and that one in which the degree of short-sight is steadily increasing is, in the vast majority of cases, a diseased eye. Professor Donders, of Utrecht, to whom we are indebted for investigations which have been fruitful of knowledge with regard to the optical conditions of vision, wrote, after examining more than 2,500 short-sighted eyes, “*ein kurzsichtiges Auge ein krankes Auge ist.*” The truth is, that the elongation of the eyeball from front to back, on which short-sight depends, is a consequence of stretching of the external or containing tunic, and that

the internal tunics, those which are composed of the internal blood-vessels and of the sensitive expansion of the nerve of sight, become stretched in a corresponding degree, and often undergo morbid changes in consequence. When short-sight is at all actively progressive, that is, when the subject of it is becoming more short-sighted from year to year, diseased changes are inevitable, and unless the progress can be arrested, the eyes must soon lapse into a condition of great jeopardy.

‘ Besides the effect upon the eyes themselves, the physical frame is sure to suffer from the necessity to bring the eyes close to their work. The neck becomes habitually bent forward, and the chest is unable to expand with freedom, whence it follows not only that the blood is imperfectly aërated, but also that it is prevented from returning easily from the head. If these conditions become established, it will not be possible for the brain, no longer fed by a full supply of healthy blood, to attain to the development and the usefulness which would have been natural to the individual owner in more favourable circumstances, and the bodily and mental vigour must both suffer accordingly.

‘ While such are the physical evils attendant upon short-sight, the intellectual evils are equally conspicu-

ous to all who are accustomed to observe them. It is not without reason that the term short-sighted is used metaphorically to denote a certain kind of mental deficiency; because a child who is suffered to grow up in a circumscribed visual horizon must necessarily be a sufferer in consequence. The effect is less manifest in some instances than in others, because it may be more or less corrected by other influences, but it is always very perceptible. The short-sighted child, as a rule, fails to develop the power of observation, which he is debarred from exercising, gains but little experience from life, and acquires but little knowledge of character or customs. He is blind to the expression of the human face, or to the larger beauties of nature or art; and his mind, even when intelligent and acute, is apt to display an acuteness which expends itself upon details, and which is incapable of taking hold of principles. In other words, the practical effect of short-sight is to shut out the subject of it from a large amount of the unconscious education which seeing the world involves, and thus to occasion losses which can hardly be made up in any other way. Taken in detail, these losses, the mere not seeing of this or that seeming trifle, may appear insignificant; it is their aggregate which becomes important. A distinguished man of

science, who is short-sighted in a high degree, and who did not receive glasses until he was nineteen or twenty years old, has often told me how much he had to do in order to place himself upon the same level, with regard to experience of quite common things, with his normal-sighted contemporaries; and it will be evident upon reflection that the matters which escape the observation of the short-sighted are of such a nature that they make up a very large proportion of the pleasures of existence. The short-sighted child has but little curiosity to explore a world which he sees but dimly; and his common habit is to curl himself up in a corner and to pore over books. He is disqualified by his defect from taking a prominent part in many games, such as cricket, football, lawn-tennis, and the like; since excellence in them cannot be attained by any player to whom a ball seems to come suddenly out of nowhere. At a more advanced age, he is equally disqualified for many callings, and especially for the navy, since glasses are useless in situations where they are constantly liable to be coated and dimmed by spray.

‘ To sum up the practical bearings of the question, it may, I think, safely be asserted that the great majority of boys, who have sound and well-formed eyes, will be able to go through the usual school and

university course of education without sustaining injury. But there is a minority (and we are hardly in a position to state what proportion it bears to the majority), in whom the conditions of safety are not fulfilled. In some instances, the eyes are short-sighted to begin with, as a matter of formation, often depending upon inheritance; and in these the short-sight, unless carefully guarded by well-understood precautions, is almost certain to increase. In other instances, the eyes are not short-sighted to begin with, but they are, to repeat the word already used, vulnerable, and especially likely to become short-sighted. Some of them may be examples of flatness, of arrested or imperfect development, others of astigmatism, others of want of due harmony of muscle, but most will have defective vision, and others will be uncomfortable when sedulously used. The cases will vary from those in which some special attention to the desk and seats, to the type of books, and to the amount and incidence of light, perhaps aided by the use of spectacles, will enable the subject to hold his own with his contemporaries, to those in which the degree of the defect is so great as to call for more care than the conditions of school life are likely to afford, and therefore to suggest recourse to some form of private teaching. The eyes of a boy are, it is

plain, the chief portals through which instruction must be conveyed to him ; and it is highly important that every teacher should know how well or ill each one of his pupils is provided with them. But, after all, the chief responsibility must rest with parents ; and it is certain that no parent should send a boy to a large school, in which there is active competition, without first ascertaining that his eyes are fit to bear the strain to which they must be exposed. I have appended to this volume a page of test-types, which may be detached and hung up against a wall. A boy who, in good daylight, can read the characters easily when standing ten feet away from them, and whose eyes do not ache either while at work or afterwards, may be sent to school with perfect safety. If a boy cannot read the types at ten feet, or if, although able to read them, he rubs his eyes and complains of discomfort after spending an hour over his books, it will be prudent to take skilled advice about him before he is suffered to enter upon a course of study which may possibly prove injurious. In short, parents may reasonably be expected to take care that their children are not called upon, to work beyond their visual endurance, just as they may be expected to take care that they are not called upon for what is, to them, excessive exertion in any other way.'

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